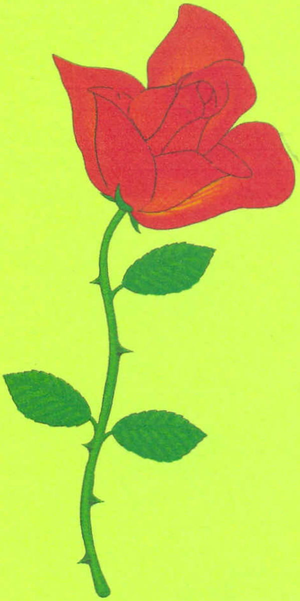
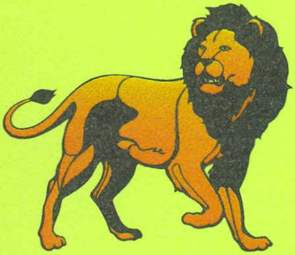
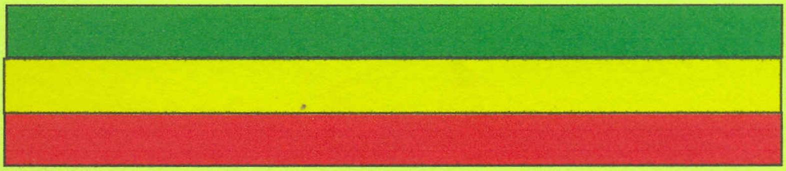
ETHIOPIAN TRADITIONAL MEDICINE:

COMMON MEDICINAL PLANTS IN PERSPECTIVE







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ID. 21643

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About the Author

Fekadu Fullas received a Bachelor of Pharmacy degree from Addis Ababa University, Addis Ababa, Ethiopia in 1980. Following his graduation, he spent five years working at the Drug Control and Toxicology Division, in the former National Research Institute of Health, also previously known as Pasteur Institute in Addis Ababa, Ethiopia, as a pharmaceuticals-laboratory control analyst. He then obtained a Ph.D. degree in pharmacognosy (the study of the chemistry and biological activity of medicinal plants) from the University of Illinois at Chicago College of Pharmacy in 1991. After completing his doctorate degree, he took a post-doctoral position with the Natural Products Drug Discovery Group at the Research Triangle Institute in North Carolina, under the world-renowned natural products researcher Dr. Monroe Wall. He was then promoted to a Research Chemist position, and worked in that capacity from 1993-1995.

During his graduate tenure, post-doctoral and research chemist careers, Dr. Fekadu Fullas has published fifteen articles in peer-reviewed scientific journals and a book chapter in an internationally acclaimed Natural Products Chemistry book series. His research publications dealt with the isolation, structure elucidation and biological evaluation of natural compounds from plants, particularly those with potential economic and medicinal values. At present, he practices pharmacy at St. Luke's Regional Medical Center in Sioux City, Iowa.

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Foreword

It is estimated that about 80% of the world population use traditional medicine for various illnesses. In many cultures, the use of traditional healing systems has evolved over a long period of time. In recent years, there has been a global resurgence of interest in herbal medicine among both the common populace and the elites of developing and developed countries. Ethiopia is, of course, no exception to this. The reasons for the reinvigorated and burgeoning interest are multi-fold, and differ from one part of the world to the other. In the West, the main driving force is the ever-increasing public awareness of the potential usefulness and safety of botanical products. In the United States, herbal products are sold as over the counter items in pharmacies and health food stores, along with other so-called dietary supplements, including vitamins, minerals and amino-acids. In Europe, herbal products are a component of mainstream medicine and are profusely prescribed by contemporary physicians. The back-to-nature movement that has taken this part of the world by storm has undoubtedly been influenced and fueled by the bewildering and massive literature circulated by a great number of big manufacturers of botanical products and other dietary supplements to promote the sale of their products. The scientific literature has also focused on these products more than ever before, and is replete with an array of reports on the various facets of natural products, including medicinal plants. In developing countries, herbal medicine is part of the respective historical heritage and a component of the popular culture of each country. It has been practiced for several centuries, and is still an important element of present-day indigenous medicine of developing societies. In this part of the world, people turn to traditional medicine not only out of necessity and economics, but also due to the deep-seated belief in folkloric remedies that have sustained their health through generations.

Ethiopia is endowed with an affluence of botanical remedies that have proven useful over a long time, especially in the rural areas where modern health care is much less accessible. This book highlights the uses of 99 medicinal plants, widely employed in various parts of the country. The traditional uses of these plants range from expelling the common intestinal parasite, the tapeworm to treating cancer. Some of the therapeutic claims attributed to certain medicinal plants may be exaggerated and difficult to verify by scientific experimentation. In addition to their being widely used, almost all of the herbs were also selected on the basis of their ability to be used as single-ingredient therapeutic modalities, without necessarily admixturing with other plants. More detailed discussion is provided in the monograph section on those herbal remedies (24 medicinal plants), for which there is sufficient literature evidence to back up the purported uses. The information included in the monographs is summarized from reputable literature sources, which mention similar uses in other cultures and/or provide scientific evidence to indirectly justify their use in Ethiopia. Detailed discussion and structure drawings of chemical constituents of the herbs in question have been deliberately avoided, so as not to burden the reader with cumbersome technical information. The respective bibliography and references therein may be consulted for more insight.

In order to make the reading easier, a glossary of technical terms has been provided. An index is given to facilitate the location of topics of interest in the book. Should one decide to use any of the herbal remedies described in this book, the author does not guarantee therapeutic results and safety in every case. The reader is advised to use his/her discretion in deciding to use a certain remedy, since the information provided in the book is of a general nature, and the remedies must be tailored to the individual's parameters, such as age, weight, sex, concomitant complications, etc.

Preface

A concise and critical compilation of common Ethiopian medicinal plants is lacking to date, although sparse reports and publications have appeared in the literature. The majority of therapeutic claims attributed to Ethiopian herbal remedies have been based, as oftentimes is also the case elsewhere in the world, on anecdotal accounts handed down from generation to generation, rather than on scientific data derived from laboratory experimentation. However, this state of affairs by no means diminishes the age-old usefulness and importance of these remedies. A review of the literature reveals that, among many others, a book was published in1973 by Strelcyn elaborating hundreds of Ethiopian plants of medicinal and economic importance. In 1976, a material listing over 300 plants along with their uses, plant parts employed and locations where the plants were collected was published by the Biology Department of Addis Ababa University (Addis Ababa University, 1976). More recently, an important and well-researched work was published, describing over 240 medicinal plants (Abebe and Ayehu, 1993). Scientific investigations have been conducted on the antimicrobial, antifertility and taenicidal activities of a large number of Ethiopian medicinal plants (Desta, 1993; 1994; 1995). Furthermore, several reports giving detailed accounts of a number of folkloric medicinal plants have appeared in various journals.

This book attempts to bridge the gap by pooling together relevant and critical information. It thus provides a general and quick reference guide to those who are interested in acquainting themselves with common Ethiopian medicinal plants, and to those who are inclined to further research useful herbal remedies. The compilation draws mainly on books and articles published previously over the years. It does not claim to be an exhaustive and comprehensive treatise; however, as daunting a task as it may be, a timely and modest attempt to collate pertinent information in a single volume is warranted, and hopefully opens up further research into the various facets of useful plant medicines. As more research and scientific validation are carried out on common Ethiopian medicinal plants, the publication of thorough and detailed monographs dealing with methods of preparation, indications for use, dosage, side effects and contraindications may be envisioned.

The vast collection of plant specimens that are housed at the National Herbarium in Addis Ababa, Ethiopia is a significant impetus to research medicinal plants by facilitating their facile identification and designation of correct Latin binomials (scientific botanical names), which is a prelude to further scientific investigation. Medicinal plant research is a synthesis of ethnobotanical (ethnomedical) information either annotated on voucher specimens or published elsewhere, interviewing local people, and of subsequent biological and phytochemical analyses in the laboratory. A systematic research is a *sine qua non* to developing rational phytotherapy guidelines and recommendations. Non-biology driven chemical laboratory investigations may not, by itself, yield results of public health significance. Biological models with predictive capability should be developed in order to test purported uses of medicinal plants and delineate safe dose range and optimal effective therapeutic doses.

It is estimated that about 80% of the Ethiopian population, predominantly in the rural areas, use traditional medicine. There are about 6,500-7,500 plant species in Ethiopia, of which an estimated 12% (870) are endemic to Ethiopia. The Addis Ababa University National Herbarium houses some 70,000 voucher specimens, representing about 50-60% of the entire Ethiopian plant species. There are about 250 plants used commonly for medicinal purposes.

♣♣♣ Chapter 1 ♣♣♣

DEFINITION OF TRADITIONAL MEDICINE AND RELATED CONCEPTS

In 1976, a group of experts from the African region met under the auspices of the World Health Organization (WHO) for Africa and defined traditional medicine as follows:

> *"......... the sumtotal of knowledge and practices, whether applicable or not, used in diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing."*
>
> *"Traditional medicine might also be considered as a solid amalgamation of dynamic medical know-how and ancestral experience."*

> *"Traditional African medicine might also be considered as the sumtotal of practices, measures, ingredients and procedures of all kinds, whether material or not, which from time immemorial has enabled the African to guard against disease, to alleviate his sufferings and to cure himself."*

Furthermore, the expert group adopted a definition of the traditional healer as follows:

> *"………a person who is recognized by the community in which he lives as competent to provide health care by using vegetable, animal and mineral substances, and certain other methods based on social, cultural and religious background as well as the knowledge, attitudes and beliefs that are prevalent in the community regarding physical, mental and social well-being and the causation of disease and disability.'*

The term 'traditional medicine' is seldom used in the West in reference to non-conventional medicine. Instead, terms like "alternative medicine", "complementary medicine" and "non-traditional medicine" are used. On the other hand, the term "traditional medicine" in the Western context refers to modern medicine.

Medicinal plants are usually referred to as herbs. According to WHO, herbal medicines are defined as: "*finished products that contain active ingredients in aerial or underground parts of plant, or other plant material or combinations thereof, whether in the crude state or as plant preparation. Plant material includes juices, gums, fatty oils and any other substances of this nature. Herbal medicines may contain excipients, in addition to the active ingredients.*" In the botanical nomenclature, herbs are non-woody seed-producing plants that die down to the ground at the end of the growing season, usually winter. In culinary usage, herbs are vegetable products that are utilized to confer flavor or aroma to foods. In medicine, however, herbs refer to botanical remedies derived from shrubs, trees, or herbs. Thus, they can be woody or non-woody medicinal plants, either from a cold or tropical climate (Duke, 1997). Tyler (1994) defines herbs as "*crude drugs of vegetable origin utilized for the treatment of disease states, often of a chronic nature, or to attain or maintain a condition of improved health.*" Phytomedicinals (plant medicines) are obtained by extraction of medicinal plants usually with water, alcohol, or the like, to make them suitable for administration.

The knowledge of medicinal plants in Africa is passed from generation to generation most of the time orally, rather than in written form. When the herbalist (medicine man) approaches his death, he transmits his expertise to his eldest offspring (son) in an incomplete fashion. The son is sometimes instructed in the field as to the identities of the plants, when and where they are collected. He takes an oath that he would not share these secrets of healing with anybody. This situation of secrecy opens the door for some pseudo-herbalists to make quick money by concocting any imaginable mix of plants, which may not be effective in alleviating the ailments of those who seek treatment (Kokwaro, 1975).

FACTS AND FICTIONS ABOUT HERBAL MEDICINE

It is estimated that world-wide there are between 250,000 and 750,000 species of flowering plants (higher plants), of which only 5 to 15% have been investigated for certain biologically active principles (DerMarderosian and Lawrence, 1988 a). About 50,000 of the known species have been used as medicinal agents by one culture or another at some point in time (Cardinale, 1997). Considering these figures, it is evident that the plant kingdom is yet a much-untapped resource and virgin territory insofar as future discoveries of drugs are concerned.

The usefulness of plants in medicine can be appreciated by observing the sources of modern drugs that are widely used today. According to a survey conducted in the United States in 1973, about 25% of community filled prescriptions contain as their active ingredients natural compounds derived from plants (Farnsworth and Morris, 1976). Nearly a third of all prescription drugs available today originate directly or indirectly from plants (Keller, 1998). That there are about 120 therapeutic agents of plant origin attests to the fact that plants continue to be potential sources of drugs (Farnsworth *et. al.*, 1985). Which oncologist does not include vincristine and vinblastine and the recently launched taxol in his/her arsenal of useful chemotherapeutic agents? Which physician does not resort to the powerful morphine and/or its chemical relatives to control the unrelenting pain of a debilitated patient? Which cardiologist does not consider using digoxin to improve the condition of a Congestive Heart Failure patient? Who, among cold sufferers, has not benefitted from the decongestant effect of pseudoephedrine? Indeed, plant derived medicinal agents run the whole gamut of products ranging from anti-cancer agents, anti-infectives, laxatives to psychoactives and sedatives. Furthermore, a large number of therapeutic agents of diverse pharmacologic profiles are based on man-made synthetic modification of lead prototype compounds, originally obtained from plants.

It is also interesting to note that various laboratories in academia, private institutions and industry throughout the world are following up on leads from natural sources (plants, marine organisms, etc.) to discover potential drugs for combating diseases. Of particular importance, though, are the efforts of scientists to probe into nature in their quest to unravel effective treatments, if not cures, for such devastating diseases as cancer and the human immunodeficiency virus (HIV) infection. In the anti-cancer research arena, the *Vinca* alkaloids vincristine (Oncovin®) and vinblastine (Velban®) from the Madagascan periwinkle *Catharanthus roseus* and taxol (Paclitaxel®) from the Pacific yew tree *Taxus brevifolia* stand out as prominent examples of molecular entities developed from plants to fight various cancer types. Similar efforts are also being put into searches for natural agents to fight the deadly HIV infection.

Long before drug laws and modern drug evaluation criteria came into existence, people in different cultures had used herbal remedies, based on past experiences and anecdotal accounts passed from generation to generation. For example, without having the slightest knowledge of the active principles of the bark of the *Cinchona* plant, natives from the jungles of Peru in South America used the tree to treat fever caused by malaria. Subsequently, the substance quinine was found to be the active antimalarial constituent, and its discovery thus marked a milestone in plant drug research. Several other examples could be cited, wherein ethnobotanical (traditional) medical uses of plant drugs correlated with the pharmacologic effects of the active ingredients contained in the plants. In fact, 74% of the 120 plant-derived therapeutic agents that are used in modern medicine today were discovered as a result of efforts to isolate the active constituents responsible for the indications for which the plants were used originally in traditional medicine (Farnsworth *et al.*, 1985). Even today, most natural product drug discovery programs are predicated primarily on insights obtained from systematic studies of well-documented uses of medicinal plants in various traditional systems.

On the other hand, herbs with questionable beneficial effects or even toxic attributes have also been used by people in their long quest to find useful plant remedies. The fact that herbal remedies are natural does not necessarily mean that they are safe and effective. In fact, some of the most toxic substances known to man, such as amatoxins, convallatoxin, aconitine, strychninie, abrin and ricin originate from plants. Some medicinal plants known to contain proven medicinally useful chemical entities may be toxic due to other harmful constituents. The comfrey plant is just one example in this regard, the toxicity of which is attributed to its pyrollizidine alkaloidal content. Herbs, as some tend to claim, do not have mystical, or magical properties. Supernatural and astrological influences of herbs are not amenable to any scientific verification (Tyler, 1994).

In Ethiopia, as there are time-tested indigenous plant remedies for various complaints, there are also some aspects of herbal remedies that do not lend themselves to scientific explanation. Some examples of these practices are given as follows (Abebe, 1984; 1986):

- *Solanum migrantum* (*zerch embuay*), used for the treatment of syphilis, should be collected only on Wednesdays and Fridays by a sexually inexperienced boy, using a metal dagger with a wooden handle made from *Olea africana* (*woyera*).
- *Impatiens capensis* (the *telenj* plant), used to treat diarrhea and bleeding, should be collected using a knife with a horn handle.
- Medicines tied as belts are believed to expel intestinal worms and to arrest bleeding in women after delivery.
- Amulets (*kitabs*) with or without medicinal substances are worn to ward off evil eye *(buda)* and devil or demon (*gannel*).
- A patient may be prohibited from walking over a freshly terraced farm while taking drugs for the treatment of rabies.

- On some occasions when taking *kosso* for the treatment of tapeworm infestation, a ritual is followed (Pankhurst, 1990):

> *".......when everything is quite ready a naked sword is placed flat upon the ground upon which the patient stands. The nurse then takes between two bits of sticks as a substitute for tongs a small bit of lighted charcoal, and carries it around the vessel [containing kosso] three times, mumbling a prayer, at the end of which the charcoal is extinguished into the medicine which is immediately drunk off by the patient........"*

The above examples go to show clearly that some practices associated with the use of herbal medicine do not have a valid basis. In reality, plant medicines owe their activity to the chemicals contained in them, as a result of their biochemical interactions with bodily cells to elicit pharmacologic response, in the manner that modern medicines work.

EVOLUTION OF PLANT MEDICINES

Throughout history, humans had been looking to nature to provide them with remedies for their various maladies. In so doing, they had been using a trial and error approach to sort out which plants are therapeutic and which are not, and further which are too toxic to use. From archaeological findings, there is a speculation that as early as some 60,000 years ago the Neanderthal man had a rudimentary pharmacopeia. Remnants of medicinal plants have also been found near stone-age sites (*ca.* 10,000 B.C.). The first pharmacopeia of the Chinese appeared about 5,000 years ago, and included plants like opium poppy and ephedra, which are used to this day. Ebers papyrus, one of the most ancient pharmacopeias of Ancient Egypt and Eastern Mediterranean, was discovered in 1873 in Thebes, Egypt by Professor Ebers, and this document dates back to 1555 B.C. It is also presumed to contain medicaments used as far back as 3300-2500 B.C. The papyrus opens with an introduction which reads: "*here begins the book on the preparation of medicines for all parts of the human body.*" Of a total of 700 drugs listed in the papyrus, 160 have been found to be of plant origin, including senna, poppy, castor oil, mint and Indian hemp. Early on, the Egyptians were acquainted with many of these plant drugs. Homer writes the following of ancient Egyptian medicine:

> *Such cunning drugs had the daughter of Zeus,*
> *drugs of healing, which Polydama, the wife of Thon had given her,*
> *a woman of Egypt, for there the earth, the giver of grain, bears greater store of drugs, many that are healing when mixed, and many that are baneful; there every man is a physician, wise above human kind;*
> *for they are the race of Paeeon.*

Paintings of the Valley of the Queens indicate that Queen Hatshipsut (1504-1483 B.C.) sent an expedition to Africa in 1493 B.C., including Nubia to search for useful drugs. *Kosso* was one of the most antique remedies the expedition took back to the queen from Abyssinia (DePasquale, 1984).

Around the same time (about 2000 B.C.), there was a parallel development in Mesopotamia. About 600 cuneiform tablets listing some 250 drugs used by the Assyrians were found, which contained plant medicines like poppy, belladonna, Indian hemp, myrrh, thyme, juniper, etc. It is interesting to note that in the medical practice of this period, medicines were first tried on slaves to find out about their efficacy, before they were ever given to relatives of king Assurbanipal.

Jewish medicine took many remedies from that of Egypt. As far back as 1900 B.C., at the time of Abraham and Jacob, Israelite vendors roamed about villages selling spices, gums, balsam and various other medicines.

In the American continent, the various Indian tribes (Dakota, Winnebago, Pima, Apache, Comanche, Mescarleros, etc.) used decoctions from the leaves and bark of the willow, of dogwood and cinchona as febrifuges; decoctions of the leaves of holly, spurge, iris blood wort as emetics; cascara sagrada, American aloe, may apple, jalap as laxatives and purgatives; red oak, cushaw-pint, senna snake root as antidysenteric; lobelia for asthma, etc.

Coming to more recent periods in the fourth and fifth centuries B.C., the Greeks used medicinal plants widely. Homer, Herodotus, Hippocrates and Theosphrathus mentioned various plant remedies in their writings. At the time of Nero, Dioscorides, a Greek physician of the Roman army, compiled a comprehensive *Materia Medica,* which later spread to the Roman and Arab world. It was considered as a bible for physicians of the Greek-Roman period and in the Middle Ages. In this book, Dioscorides described the characteristics and medicinal uses of about 500 drugs of plant origin (pyrethrum, rue, scammony, poplar, poppy, myrrh, colocynth, etc.).

After the fall of the Roman empire, Arabic medicine became dominant and incorporated the Greek-Roman culture, including the use of vegetable drugs. Galen, a Roman doctor (130-201 A.D.) who was the father of modern bio-medicine, recommended many herbal preparations, including poultices, gargles, pessaries, ointments, oils, cerates, inhalations, etc.(DePasquale, 1984). The term galenicals (compound formulation) was derived after his name. Thus, after a series of historical transitions modern vegetable pharmacopoeias as we know them today developed in different parts of the world. A brief survey of current use patterns of medicinal plants in various cultures is in order.

A BRIEF REVIEW OF MAJOR TRADITIONAL MEDICINE SYSTEMS

1. Herbal Medicine in the West

As mentioned elsewhere, traditional medicine in the West corresponds to contemporary medicine, whereas the term alternative medicine (natural, non-traditional, complementary medicine) would be the equivalent of traditional medicine in other parts of the world. Herbal medicine is an integral part of alternative therapy, which in turn encompasses *inter alia* such practices as hypnosis, acupuncture, reflexology, aromatherapy, hydrotherapy and homeopathy.

In the United States, there is an ever growing public interest in the use of herbal products. Sales have skyrocketed over the past several years. These products are sold in pharmacies and about 800 health food stores across the country. There are about 1,800 herbal products available to the American public, of which only 10 to 15 products are the best sellers, accounting for about 70-80% of the total sales (Cardinale, 1997). These products include such popular herbs as echinacea, garlic, gingko biloba, goldenseal, saw palmetto, aloe, ginseng, cat's claw, astragalus and caymene. Currently, it is a market worth $3 billion. Pharmaceutical giants like Bayer Corp., Warner-Lambert and American Home Products are entering the burgeoning herbal market with their own line of products (Emerich, 1999). About 60 million Americans use herbal remedies for various complaints. The regulation of herbal products in the United states is rather complex. In 1994, the United States Congress enacted a legislation (The Dietary Supplement Health and Education Act PL. 103-417), which stipulated dietary supplements to include herbs, vitamins, minerals and amino acids. With a disclaimer that a product was not evaluated by the Food and Drug Administration (FDA) for the treatment, cure, or prevention of any disease, it could be marketed without any pre-clearance, as long as the product bears only "structure/function" claim label. For example, a manufacturer can claim that its product maintains healthy cholesterol level, whereas a statement that a product lowers cholesterol level would be deemed a therapeutic claim and therefore unacceptable to the powers that be at the FDA.

Herbs are a prominent part of health care in Germany. They have been accepted officially as medicinal agents, perhaps more than in any other western country. In 1978, the German Federal Institute for Medical Devices established an expert committee called the German Commission E (a panel of medical and pharmacy experts) to examine about 1,400 herbal remedies from 600-700 plant species. The committee undertook a critical evaluation of clinical trials, single cases and scientific literature reports. This work has culminated in the publication a total of 391 monographs thus far (Blumenthal *et al.*, 1998). Each monograph gives for each product the identification, composition, use, contraindications, side effects, precautions, dosage, preparations and effects. Most of the herbs listed are deemed safe and effective, based on long use and positive supporting literature reports. To be approved a product must be absolutely safe and reasonably efficacious. More than 70% of general practitioners in Germany prescribe herbal medicines, many of which are covered by national health care insurance. The market of phytopharmaceuticals in Germany is estimated at $3 billion annually (Brown, 1996).

Total sales of herbal medicines in the European Union is about one-half the yearly sales of herbs worldwide (Brown, 1996). European countries have established the European Scientific Cooperative on Phytotherapy (ESCOP), entrusted with the task of publishing herbal monographs which would serve as a basis for approval of herbs as medicinal products. This is being compiled in collaboration with the European Pharmacopoeia, and when completed is thought to supersede the German Commission E monographs.

In Canada, herbs were classified under a special category called "Folklore Medicines". They could be marketed with traditional claims of therapeutic efficacy, but should be demonstrated to be safe (Tyler, 1994). Commonly used herbs with certain limited therapeutic claims are allowed to be marketed under the Canadian system. A recent statistic shows that about 55% of Canadians use natural products for the prevention of illnesses. There is also a tendency on the part of Canadian health officials to classify Natural Health Products (NHP) in a third category, with the first and second being the categories of drugs and foods, respectively. According to this proposal, natural products, including herbs will be subject to testing and labeling requirements yet to be formulated (Anonymous, August 1999).

2. Traditional Chinese Medicine (TCM)

Traditional Chinese Medicine, which comprises of acupuncture and the use of herbal medicines has been practiced in China for thousands of years and is on equal footing with conventional western medicine. About 5,000 plant species used as medicinal plants were published in four volumes of the *Chinese Materia Medica* (Qicheng, 1980; Beratni, 1999). Most Chinese medicines are prepared from herbs found in Asia. About 500 plant drugs are listed as official in the Chinese Traditional Medicine Pharmacopoeia.

TCM, also known as Oriental Medicine, is holistic in that it considers illnesses to be caused by imbalance between the body, mind and spirit, which normally function in unison, and illness symptoms are thought to be manifestations of this imbalance (Beratni, 1999). Therefore, TCM aims at restoring the natural harmony between these forces.

Practitioners are formally trained at the masters-degree level before they officially practice. The Chinese experience reflects a synthesis of the merits of both traditional and western systems of medicine through a thorough application of scientific methodologies.

For example, although acupuncture has been used in China for several centuries, it was only recently that the principles of modern sciences like anatomy, physiology and biochemistry were utilized to explain the mechanism of this practice, which in turn led to improvements in equipment and techniques. It is now useful in surgeries. Likewise, most medicinal plants have been subjected to rigorous scientific studies to ascertain their usefulness.

3. The Japanese Oriental (Kampoh) Medicine

Kampoh medicine is derived mainly from Chinese traditional medicine. It is a modified old Chinese medicine, which was introduced and established in Japan in the 14th-16th centuries. Today, it is an officially accepted practice. The Japanese Pharmacopoeia includes 116 herbal drugs, the majority of which are of Chinese origin. High quality research has led to good quality control of active ingredients in herbal preparations and reliable pharmacological tests, although limitations exist. Herbal drugs are handled by well qualified professionals (Natori, 1980).

4. The Indian Ayurveda system

This system originated in India more than 5,000 years ago. Ayurveda is a Sanskrit word which means “The Science of Life.” It is also widely practiced in Sri Lanka. The practitioners of this system use diet, herbs and balanced life-style to help people maintain or regain balance and health. The principle of this system is mostly based on preventative rather than curative approach. The herbal products used are complex blends and multi-component. It is a holistic system in that it considers the human body as a whole. About 2,000 plant species are used to prepare a variety of herbal medicines (Weragoda, 1980). This system, like the Chinese, trains practitioners in modern formal training.

5. African Traditional Medicine

In most parts of Africa, the knowledge and practice of traditional medicine are based on oral traditions, and are mostly shrouded in secrecy. In the past, this knowledge about medicinal plants and its practice were held exclusively as family, clan or tribal secrets. The medicine men are the official practitioners of traditional medicine, most of whom are illiterates (Lantum, 1980).However, various ethnic pharmacopoeias have been emerging in different regions of Africa. Thus, brief reviews have appeared in the literature on the status of medicinal plants found in Egypt (Sayed, 1980), Ethiopia (Ricci, 1980), Francophone countries (Lantum, 1980), Mozambique (Amico, 1980), some countries of Africa south of the equator (Lantum, 1980), Somalia (Elmi, 1980) and West Africa (Lantum, 1980; Ogukawa, 1980).

♣♣♣ Chapter 2 ♣♣♣

HISTORICAL DEVELOPMENT OF TRADITIONAL MEDICINE IN ETHIOPIA

The historical development of Ethiopian traditional medicine has not been immune to the influences of the surrounding areas across the Red Sea and the Mediterranean Ocean. As a result, it is an amalgam of indigenous African traits and exotic foreign elements. The introduction of Semitic religions, like Judaism, Christianity and Islam had significant influences on indigenous medicine. Ethiopian Christianity and Islam had both rejected the "rational philosophical outlook of the Greeks", while they introduced Jewish cosmology. Ethiopian Orthodox Church preached about the eternal struggle between God and Satan, and angels and demons. Ethiopian Islam introduced *jinns*, which could be dominated and worshiped by man (Bishaw, 1991). The beginning of traditional medicine in Ethiopia is not accurately known, particularly in its recorded form. Perhaps it dates back to several centuries ago. Historians estimate that Ethiopian traditional pharmacopeias may have existed as early as the fifteenth century (Abebe and Ayehu,1993). However, the earliest known text of Ethiopian traditional remedies is perhaps the *Geez* "*Metsehafe Fews*" written around the middle of the seventeenth century. Another text, "*Metsehafe Medhanit*", also written in *Geez* was published in the eighteenth century. It contained thousands of prescriptions for a wide range of diseases (Pankhurst, 1990; Abebe, 1996). Pankhurst (1999) speculates these seventeenth and eighteenth century texts may even be older, having been copied from older texts. According to him, the original versions might date back to the fourteenth or thirteenth centuries, if not older. Information on the use of traditional medicine, including medicinal plants has also been documented in travel accounts of the Presbyterian Jesuits, Alvarez and Almeida in the sixteenth and seventeenth centuries, in reports by Western physicians and in the medical treatises of Ethiopian scribes (*debteras*). At any rate, these accounts are fragmentary and superficial. A twentieth-century text authored by a *debtera* at Entoto, Addis Ababa contained a considerable amount of information on traditional medical practices (Pankhurst, 1990).

In 1878, Emperor Yohannes IV issued a decree prohibiting the practice of sorcery and witchcraft. According to this edict, those persons holding *zar* dance sessions (*zar guri*) would be banished and their properties confiscated. Of course, the driving force behind this move was the Emperor's own belief in Ethiopian Orthodox Church teachings, which preached that evil spirits are the causes of mental diseases, and as such should be treated by priests of the church with holy water. Emperor Menelik (1890-1913), a modernizer and believer in modern health systems himself, was tolerant towards the practice of traditional medicine. In fact, the last resort treatment for his debilitating illness was with the holy waters of Debre Libanos (Bishaw, 1991).The practice of traditional medicine in Ethiopia was legalized by a proclamation in 1942, authorizing traditional healers to practice non-dangerous indigenous traditional systems. This was reinforced by yet another proclamation issued in 1948, which encouraged not only the practice of safe therapeutics, but also the voluntary registration of traditional healers with the Ministry of Health. In the 1950s, as part of the registration process practitioners were required to submit a list of herbs they used in their practice, in order to ascertain their safety. However, the healers were not compliant with this stipulation, and were secretive about their practices. The medicines they provided were multi-component and thus were not amenable to identification and scientific analysis, although they were generally safe. Proclamation No. 127/1977, sub-article 2 created a favorable condition for research in traditional medicine, by emphasizing the need to "promote and encourage the use of traditional drugs along with modern ones." As a result, the Coordinating Office for Traditional Medicine (later Department of Traditional Medicine) was established in 1979 within the Ministry of Health (Waldeyes, 1990).

The Coordinating Office for Traditional Medicine was entrusted with the tasks of:

- Organizing, training and registering of traditional healers;
- Coordinating and encouraging research into traditional medicine;
- Identifying and registering traditional remedies with potential usefulness;
- Exploring the possibilities of establishing herbaria and museums for medicinal plants and artifacts; and
- Paving the way for the final integration of traditional medicine into the official healthcare system.

The main source of funding was WHO. By 1996, this organization had provided assistance worth about US $ 600,000. The United Nations Development Agency (UNDP) also provided material, financial and personnel support towards this endeavor. Despite the continuous funding, there was a concern that sufficient progress had not been made to show demonstrable and practical application of the efforts that the Coordinating Office made (Mwambazi, 1996; Bishaw 1991). However, reportedly about 6,000 traditional healers were registered by 1986. The few associations that sprang up as a result of the initiative of the Ministry of Health were eventually disbanded, due to lack of sustained support rendered to traditional healers and inadequate funding of the Coordinating Office. Although a few isolated seminars were held for traditional medical practitioners and their counterpart modern health practitioners, the initial momentum was lost. The focus shifted primarily towards laboratory investigation of medicinal plants, especially those with harmful attributes. About 200 plants were reportedly scientifically studied (Bishaw, 1991).The extent and depth of this study were, however, limited.

The National Ten-Year Prospective Plan (1984-1994) provided for the organization, training and supervised utilization of traditional medical practitioners. The need to promote traditional medicine was predicated on the facts that:

(a) traditional medicine was part of the popular culture, with 80% of the population using it for various medical complications;

(b) many traditional medicines and practices were already known to be efficacious;

(c) traditional medicine was less costly than modern medicine;

(a)adequate resources were not available to provide modern healthcare services, and

(e) utilization of traditional medicine was considered as one way of making a progress towards self-reliance.

In 1985, a committee of experts was set up by the Ministry of Health to look into ways and means of strengthening traditional medicine in Ethiopia. The committee recommended that legislation be enacted for the promotion and official utilization of traditional medicine. Furthermore, it suggested that the Office of Traditional Medicine be expanded, its budget be increased, more personnel be trained at the Ph.D. level, and the Office be expanded and restructured organizationally. Most of the recommendations of the committee were ambitious, while some were unrealistic. As a result they were not followed up on. The goals and objectives set by the Ten-Year Prospective Plan were not supported and augmented by a corresponding government policy. Thus, the Office failed to achieve the goals set for it (Bishaw, 1991).

In 1993, a Health Policy and a National Drug Policy were drawn up , with provisions that the beneficial aspects of traditional medicine through research and their utilization in public health would be encouraged, and that rewards and patent rights would be granted to researchers for their findings. In addition to the National Drug Policy, the Science and Technology Policy encouraged herbal medicine research. However, a detailed strategy for the development and integration of traditional medicine seems to be lacking. Pertinent laws and mechanisms to implement stated policies are not in place.

The Department of Traditional Medicine (formerly the Coordinating Office for Traditional Medicine) was reorganized into the Drug Research Department within the Ethiopian Health and Research Institute (formerly Pasteur Institute; National Research Institute of Health). This decision was made in order to pool the scarce laboratory equipment and multi-disciplinary skilled manpower. A new laboratory complex was built to provide more space and facilitate research. By 1996, the Department had identified over 600 medicinal plants, and for about a third of them chemical and biological profiles have been compiled from the scientific literature (Abebe, 1996a).In spite of the commendable efforts of the Drug Research Department, no substantial output has been made in respect of applying informed traditional medicine in the public domain.

COMMON TRADITIONAL MEDICAL PRACTICES IN ETHIOPIA

Ethiopia is a culturally diverse society, which is also reflected in the rich variety of medical beliefs and practices. Many cultural groups have comparable medico-religious beliefs, as, for example, in the causation of illnesses, which falls in the domain of the supernatural, rather than natural force (Bishaw, 1991). For example, it is the official teaching of the Ethiopian Orthodox Church that certain illnesses, mainly those that affect the mind, are caused by evil spirits. *Memihi*r Wolde Tinsaye Gizaw, an Orthodox Church priest, was reported to claim to have cured more than a million people in Ghion (Welliso) over a period of 14 years. In almost all cases, spirits (*seytan, agannent, ayne tila, buda* and *zar*) were implicated in possessing the patients. *Seytan* and *agannent* are other names for the devil, which causes mental illnesses, while *zar* possesses the opposite sex for sexual reasons. *Ayne tila* affects behavior, like the condition of being shy amongst children. In modern psychiatric terminology, possession is sometimes referred to as dissociative reaction, hysteria, or hypnosis, all manifestations of altered consciousness (Giel *et al.*, 1968).The supreme deity is believed to be responsible as much for the bad afflictions as for the good fortunes.The sky-god (supreme deity) is known by various names: *waqa, waqaio* among the Cushtic-speaking people; *tsosi* or *t'osa* among the Omotic speakers; and *jar* or *zar* among the various Cushitic, Omotic and Semitic speakers. The supreme deity is believed to work through his proxies, like the benevolent spirits, *adbar, ayanna, qolle, wuqabe*, which interact with humans. These guardian spirits watch over, guide and protect humans. Malevolent (evil) spirits such as *gannen, jinn, seytan*, or *buda* (evil eye), on the other hand, are believed to cause illnesses. The Supreme Being is thought to be inaccessible to ordinary folks. However, a few people can access the proxy earth-bound spirits (good and evil). These are the *debtera* of the Orthodox Church; the *shiek* and *fakir* among Muslims; *qallu, qallicha, argessa* among Cushitic speakers and Muslims; and the *bale zar* among most linguistic and religious groups. These individuals acquire their purported power over the spirits, either through inheritance and family traits, or through learning and apprenticeship. The *debtera* (cleric-diviner-healer), or *atmaqi* (baptizer-exorcist) exorcizes malign spirits, such as *buda* and *gannen* (devil), while *zar* spirits are negotiated with and appeased by the *bale zar* (*zar* shaman). The *atmaqi* can be an Orthodox Christian priest or monk, or a Muslim *shiek*, whose healing power is derived from using holy waters. Illnesses perceived to be caused by poisoning, or intestinal parasites are treated by the *medihanit awaki* (herbalist) (Bishaw, 1991).

Ethiopian traditional healers mostly occupy prominent positions in society. They are recognized by various names, depending on their expertise and location of practice. Some of these names are: *medhanit awaki, taghisancho*, *oghessa, fetalay* for herbalists; *weggesha, karlamancho* for bone-setters/surgeons; *yelimd awalaj, oghetti, ilsisaita* for traditional midwives; *qalicha, debtera, kabira, suaita, segora* for spiritual healers (psychotherapists) (Woldemichael, 2000).

A study published by Slikkerveer in 1982 recognized three traditional medical systems in eastern Ethiopia: the Cushitic, the Arab-Islamic and the Amharic-Coptic systems, which can perhaps be considered representative of the rest of the country. These systems coexisted with modern medicine.

The local indigenous Cushitic sub-system which evolved since the sixteenth century was practiced among the Oromos and the Somalis, who used medicinal plants in combination with other household remedies, as well as magico-religious practices. Other medical practices included bone-setting, cauterization and counter-irritation. The practitioners of this system are the local spiritual healer, *qalicha* (*qalu*), the Cushitic pragmatic healer, the *agaissa* and the local birth-attendant, the *agaitti*.

The regional Arabic-Islamic medical system originated in the ancient Mediterranean World and spread to Ethiopia during the twelfth and thirteenth centuries and the second part of the nineteenth century. It intermarried and amalgamated with the system of the Islamised indigenous Cushitic population groups and became a dominant system. The trained specialists of this system include the Islamic literate healer, the *kabir* and the Islamic medical teacher, the *sheik* (*shekka*).This tradition was characterized by religious Arabic medical manuscripts, books and manuals.

The other sub-system is the Amharic-Coptic medical system, which constituted the Christian counterpart of Arabic medicine. It had its roots in central Abyssinian Kingdom, and expanded eastward during the nineteenth century. Traditional Amharic medicine is practiced by Orthodox Christian literate healers, the *debteras,* the

Orthodox astrologers, *metsehaf gelach*, the mystic spiritual leaders, *zar doctors*, the pragmatic healer and bone-setter, the *weggesha* and the divine wizard, *tenquay*.

The Oromo *agaissa*, the Amharic *debtera* and *weggesha* and the Islamic *kabir* utilize medicinal plants, in addition to other methods, to treat patients based on oral and written traditions consisting of pharmacopoeia of traditional medicinal plants.

The following chart summarizes the three subsets of traditional medical system:

Traditional Medical System	**Practitioner**
Local medical system of Cushitic Medicine	*Qalicha (Qalu); Agaitti*
Regional Medical System of Arabic-Islamic Medicine	*Kabira (Kabir); Sheik (Shayka)*
Regional Medical System of Amharic Medicine	*Debtera;Metsehaf Gelach;* *Zar doctor; Weggesha*

Of the dozen or so types of traditional healers, the *debteras* enjoy the most prestige, due to their association with the Coptic church. The *debteras* had documented much information in medical texts that perpetuated much of the empirical Greco-Arabic medicine (Kloos, 1976).

Traditional medical practices in Ethiopia consist of the use of medicinal plants, counter-irritation, cautery, bleeding and cupping, surgery, bone-setting, dentistry, supernatural practices (such as magic), thermal bath, steam bath (*wesheba*) and the use of the holy water (Pankhurst, 1990). Although there is considerable literature written in *Geez* and Amharic dating back to the second half of the eighteenth century on these practices, the extent of their use by the local populace was not accurately known. Most of these practices, however, were witnessed and documented by foreign travelers.

Apparently, they may not be practiced as much today as they used to be in the past, due to partly the expansion of modern medicine. Each of these medical practices merits some discussion.

Ethiopian medicinal plants have been the vegetable sources of innumerable cures. Over the course of time, the traditional pharmacopoeia had developed to include the various parts (leaves, flowers, stems, roots, etc. and combinations thereof) of indigenous plants. Herbalists are generally known by the local generic name "*kitel betash*". They use various indigenous medicinal plants to treat patients. There is a division of labor among herbalists, based on expertise. The herbal medicine collector, known as "*medhanit qorach*", gives the herbal material, usually in unidentifiable form, to the client with no clear instruction as to how to use it. The herbal medicine compounder, "*medhanit atech*" prepares the herb and gives the patient proper instructions of how to take it. There is also a category of amulet makers "*kitab ketabi*", who specialize in making various amulets containing herbal preparations to be used as prophylaxis against certain ailments. There is yet another category of herbalists known as "*medhanit kebi*", whose expertise is to properly apply topical medicaments to treat certain skin infections. Of all practitioners of herbal medicine, the expert herbalist, known locally as "*medhanit awaki*", is the most well-versed in the preparation, administration and follow-up of herbal preparation that is used in treating the patient (Desta *et al.*, 1996). In his book, *Introduction to the Medical History of Ethiopia*, 1990, Pankhurst discusses in greater detail the various traditional medical practices. The extent to which these practices are employed in Ethiopia today is not known. The following few paragraphs only summarize the important features of these practices.

Counter-irritation is a form of treatment that was popular among many traditional medical practitioners, more so in Shewa. In order to treat inflammation of the lungs, or rheumatism, it was common practice to make several small burns on the skin using a red-hot poker or burning piece of wood. In some cases, a hollow piece of reed would be placed on the skin, followed by the pouring of boiling butter into the reed to come in contact with the skin. Application of red-hot pepper to the skin was also used as a counter-irritation method of treatment of gangrene.

Cautery was another form of treatment that was widely used. This method was used to disinfect the skin, to prevent bleeding after amputation, and for snake and scorpion bites. A burning stick would be placed on the diseased part of the body, leading contraction of the local muscles.

Bleeding was a technique used to relieve patients of headache and other similar complaints. The side of the eyebrow would be cut with a sharp knife, razor or a sharp broken glass, gushing out blood which leads to a drop in blood pressure.

Cupping was another traditional treatment that was used for rheumatism and other complaints. An incision is made on the skin of the forehead, held between the thumb and the forefinger of the practitioner. The resulting gushing blood is drawn into a cow's horn, which is allowed to be filled to a certain level and stopped.

Surgery has also been practiced in Ethiopian traditional medicine. For example, tonsilitis has been treated by using crude techniques to remove the tonsil. Wounds were also sutured with needle and thread, or even sometimes using threads tied to thorns pinned in the flesh. When amputation was required, the tendons and the ligaments were severed using sharp knives, and the resulting wound was cauterized with hot irons, boiling fat, or alternatively the wound would be covered with a bagful of medicinal leaves.

Bone-setting is widely practiced in Ethiopia, mostly with positive outcomes. Bone dislocations required the use of poultices. For more severe cases, splints of wood or bone were properly tied around broken bones, or dislocations with either cloth, or leather. In some cases, even fractured skulls have been fixed using bone pieces from sheep, or goats.

Traditional dentistry was practiced with crude instruments. Bad teeth were pulled out with pincers, or with the aid of nail and stone. Toothache was treated by applying medicinal herbs to the affected area.

Another significant aspect of Ethiopian traditional medicine is invoking supernatural forces to treat various ailments. Most people attributed most illnesses to evil eyes, spells and supernatural powers, and therefore sought magical remedies. Rheumatism and possession by demons were thought to be warded off by wearing red leather amulets, enclosing writings on small pieces of parchment around the wrist and neck. Also red coral, sea shells were worn for the same reasons. Some cures were believed to be effected by bathing in holy waters, which were found around churches and monasteries.

Thermal springs were used in the treatment of rheumatism, skin diseases, syphilis, leprosy and other diseases. The temperature of these waters would be between 49 and 60 degrees Centigrade. Thermal cures were supposed to be effected after seven days of submerging in the thermal bath for different lengths of time each day. Another popular mode of treatment, mainly for syphilis, was the steam or vapor bath which was popular in 17th century Gondar.

THE ETHIOPIAN NATIONAL HERBARIUM

An herbarium is an institution where plant specimens are catalogued and stored as references for facile identification (through comparison) of plant samples collected for chemical, biological, ethnomedical, or simply for botanical investigations. A voucher specimen collected from a population of a plant species from a certain locality is deemed to be representative of that species. A typical voucher specimen would include common names, scientific name (Latin binomial), uses of the plant, the exact locality, altitude, habitat, typical characteristics of the plant that may not be evident in the dried and preserved plant specimen, collection date, and collector's collection number. The presence of an herbarium with the required personnel, equipment and funding plays a major role in the study of folkloric medicinal plants.

There are several herbaria in Ethiopia which predate the National Herbarium in Addis Ababa. These small herbaria include the Alemaya Agricultural College Herbarium, the Jimma Agricultural

Institute Herbarium, the Institute of Agricultural Research Herbarium, the International Livestock Center for Africa (ILCA) Herbarium and the Wendo Genet Institute of Forestry Herbarium. Each of these herbaria has a relatively small collection of plants of economic importance (Kelbessa, 1986).

The National Herbarium was started in the Biology Department, Addis Ababa University in the early 1960s by Dr. H. F. Mooney. It began in earnest when Dr. Mooney, then working for the British Middle East Development Division, donated plant specimens he collected in Ethiopia along with some basic botanical literature. In 1979, the collection of plant specimens grew to 14, 000 from a bare 6,000 when it started. Although the idea to study the flora of Ethiopia was conceived as early as 1967, the Ethiopian Flora Project (EPF) was not launched until 1980, when financial and technical aid was obtained from the Swedish Agency for Research Cooperation with Developing Countries (SAREC). Medicinal plant research, plant breeding experiments, forestry, conservation of threatened species and ecosystems, and rational land use all necessitate the preparation of a flora. One of the main objectives of EFP was to build and strengthen the National Herbarium. Through the cooperation of the Departments of Botany of the Universities of Uppsala and Copenhagen and the Department and Botanical Garden of Austria, the plant collection program took big strides. As a result, in 1984 the collection grew to 28, 000 specimens (Kelbessa, 1986). The National Herbarium is reputed to be the first of its kind in sub-Saharan Africa. Currently it houses about 70,000 voucher specimens of plants, representing 50-60% of the entire Ethiopian flora (Anonymous, March 19, 1999). The Department of Systematic Botany, Uppsala University has also been training botanists at the Ph.D. level to meet the objectives of the EFP. In addition, the EFP has published two volumes on the flora of Ethiopia thus far. A comprehensive and detailed medicinal flora is required to advance an all-round research on Ethiopian medicinal plants.

SOME ETHIOPIAN MEDICINAL PLANTS

Traditional medicine has been used in Ethiopia for several centuries and continues to be widely used to this day, in particular in the rural areas, where modern health care services are inadequate, or not readily accessible. As in most other developing countries, the majority of the Ethiopian population rely on medicinal plants and other traditional medical practices to alleviate their ailments and improve their health. Despite the fact that Ethiopia had a written language for over two thousand years, traditional medicine remained an oral tradition, except in church quarters, where documents were, however, not accessible to ordinary folks.

Most folkloric Ethiopian medicinal plants and their method of preparation are often closely guarded secrets, usually passed from the father to the eldest son, as the death of the former approaches. As a result of this tradition, the oral transmission of knowledge from generation to generation gives rise to the possibility of incompleteness, omission, misrepresentation or distortion of the original medicinal plant cure as time goes by. Mis-identification of herbs, their dubious method of compounding and other variables might lead to ineffective traditional treatments.

Medicinal plants are sold in the periodic open markets of towns throughout the country and in the daily markets of Addis Ababa, along with other food items, textiles and various household utensils. In the market place, the vendors sit on an elevated dirt ground, or in stalls and spread out their display of goods and medicines. Medicinal plants for fighting evil spirits, evil eyes and the resultant *likift* are hidden from immediate sight for fear that they might lose their potency (power), and are pulled out for sale only upon request of the client.

Prior to the 1940s, Moslem merchants dominated the domestic trade, involving also the selling of indigenous medicines. After the Italian occupation, the Amharas entered the market and became the most influential traders. According to a 1976 survey, Gurage women dominated the marketing of local medicinal items in the open daily markets of Addis Ababa. A number of surveys have been reported in the literature in the past, regarding the use of medicinal plants in different parts of Ethiopia, which include surveys at markets in towns and villages in the Central Plateau and the Rift Valley of Ethiopia (Kloos, 1976; Kloos *et al.*, 1978), the central highlands of Tigre (Wilson and Gebre Mariam, 1979), and information collected from the local traditional healers of Gondar (Abebe, 1984; 1986). Table 1 summarizes some of the common medicinal plants used in various parts of Ethiopia.

Most Ethiopian botanical remedies indicated in Table 1 are almost invariably sold as whole plants, or plant parts to be ground to powder, or other appropriate forms for further processing (compounding) by the consumer, or the traditional healer. This is in sharp contrast to most herbal products in Western countries, where they are processed to modern dosage forms like tablets, capsules, etc. by big enterprises for direct consumption by the public. Presently, there is no industry in Ethiopia, which is engaged in the manufacturing of herbal products. People use their own knowledge and skill to compound their medicines from the raw materials bought at periodic open markets or collected from the wild.

While herbal medicinal preparations made in households and by local herbal experts in Ethiopia may lack the desired level of standardization, the likelihood of adulteration is remote, or at best minimal. This is a desirable feature, when compared with western practice, where certain herbal products have been found to be laced with harmful substances and conventional drugs. The Western consumer puts trust in the manufacturers of herbal products, on which, for example, in the USA the FDA does not seem to have tight control. In contrast, the consumer in Ethiopia has some hand, or degree of say in the identification and the preparation of a given medicinal herb.

TABLE 1. COMMON ETHIOPIAN MEDICINAL PLANTS AND THEIR USES

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Achyranthus aspera L. (Amaranthaceae)	Muchello	Dysentery	Crushed roots are mixed with water and drunk[1]
		Eye disease	Juice of fresh root is applied[2]
		Febrifuge	Smoke from the butter paste of roasted leaf powder is inhaled[2]
		Mennorhagia	Root is chewed and the juice swallowed[2]
		Oxytocic	Powdered root is mixed with water and drunk; or worn as amulet[2]
		Sorcery poisoning	Powered leaf, or powdered leaf and root is infused and bathed with it; leaf is mixed with garlic and black pepper, and eaten, followed by drinking mead as an antidote[2]
		Uterine bleeding	Decoction of powdered root is used as a wash[2]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Adhatoda schimperiana (Hochst.) Nees. (Acanthaceae)	Simayze; sensel	Control of lice	Body is washed with decoction of the leaves and the stem[1]
		Diarrhea	Ground seeds are mixed with fluid and drunk[3]
		Jaundice	Infusion of the leaves is taken; powdered leaf is mixed with whey and eaten[2]
		Leprosy	Decoction of the leaves is used to bathe[2]
		Liver disease	Leaves are boiled in milk and drunk; juice is squeezed out of leaves, mixed with milk or local beer and drunk; powdered dried leaves are mixed with milk and drunk[3]
		Starvation or anthrax-caused disease (kuruba)	Ground leaves are mixed with fluid and drunk[3]
		Stomach ache	Same as for kuruba[3]
		Wound	Powdered leaves are applied to affected area[3]

Ajuga remota Benth. Hoechst. ex. Nees (Labiatae)	Armagusa	High blood pressure; swollen legs and feet; stomach ache; nourishing food for lactating women	Is drunk as tea[4,5]
Albizia anthelminthica (A. Rich.) Brongn. (Leguminosea)	Messana; Shina	Taeniasis	Powdered bark eaten with gruel or bread or drunk in water[6]
Allium sativum L. (Liliaceae)	Netch shinkurt	Cold; cough	Is eaten after skin is peeled off; held in the back of the mouth; inserted in the nostrils; eaten after mixing with honey [7]
		Malaria	Not specified[7]
Aloes (Labiatae)	Erret	Ascariais	Sap is taken by itself, or sap mixed with powdered fenugreek and the belly is massaged with it[2]
		Eye disease/infection	Sap is mixed with donkey's blood and applied[2]; applied as a poultice[4]
		Heart disease	Sap is boiled in mead and drunk[3]
		Malaria	Juice from the leaves is mixed with milk and drunk[4]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Aloes (Continued)	Erret	Miscarriage	Powdered root is mixed with flour of black barley, baked and eaten[2]
		Rectal prolapse	Charred powder is mixed with honey and bandaged with *Ricinus communis* leaves[2]
		Tinea decalvans (Alopecia areata)	Sap is mixed with mead and applied[2]
		Wound; baldness	Ground roots are made to ointment and applied to affected area[3]
Aninegria adolfofriedericii (Engl) Tob & Gilb (Sapotacea)	Kerkero	Anitibacterial	Unspecified[8]
		Taeniasis	Powdered fruit made into a paste and eaten[8]
Argemone mexicana (Papaveraceae)		Lubricant; poison	Seeds are used to oil pan before baking bread[1]
Artemisia spp. (Compositae)	Arrity	Nose bleed	Leaves are placed in nostrils[4]

Artemisia spp. (Continued)		Increase of appetite in children and control of dysentery	Leaves are boiled in water and drunk[4]
		Warding off evil spirits	Pungent smell is inhaled[1]
Asparagus africanus L. (Asparagaceae)	Kestencha; Ye set kest	Hemorrhoid	Root and leaf are charred, powdered, mixed honey and taken[2]
		Infertility	Powdered root is mixed with milk and taken[2]
		Measles	Powdered leaf and root are applied to eruptions[2]
		Menorrhagia	Powdered root is mixed with honey and taken[2]
		Migraine	Stem pieces are wrapped with thread and worn around the head[2]
		Rectal prolapse	Powdered root is mixed with honey and taken[2]
		Rheumatic pain	Powdered root is mixed with whey and taken[2]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Asparagus africanus (Continued)	Kestencha; Ye set kest	Uterine prolapse	Powdered root is mixed with honey and taken[2]
Berchemia discolor (Klotasch) Hemsl (Rhamnaceae)	Dilesis	Hepatotonic	Unspecified[8]
		Taeniasis	Powdered leaf pasted in honey and taken[8]
Boswellia papyrifera (Del.) Hochst (Burseraceae)	Itan	Control of evil spirits; fever; tranquilizer	The bark and resin are smoked on fire at night[1]
Brucea antidysenterica J.F. Miller (Simaroubaceae)	Waginos; Abalo	Cancer	Unspecified plant part and preparation[9]
		Diarrhea	Ground seeds are mixed with honey and eaten[3]
		Evil eyes	Powdered root is placed in the nose[2]
		Leishmaniasis	Powdered root and leaf are mixed with butter honey and applied to affected area[2]

Brucea antidysenterica (Continued)		Rabies	Powdered root and leaf mixed with milk and taken; butter paste of powder applied to the back of the neck[2]
		Scabies	Crushed leaves are placed on affected area[3]
		Skin disease	Crushed roots are placed on affected area[3]
		Wound	Inside of seed is ground, made into ointment with butter and applied to affected area[3]
Calpurina aurea L. (Leguminosae)	Digita	Rectal prolapse	Powdered seeds are mixed with milk and drunk[2]
		Scabies	Roasted ground fruits are mixed with butter and applied topically[10]
		Syphilis	Powdered seeds are pasted with honey into tablets and swallowed[2]
		Tinea captis (pavus)	Head is washed with juice from the leaves[2]
Capparis tomentosa Lam. (Capparidaceae)	Andal	Control of evil spirits	Crushed roots are burnt in haunted place[1]
		Toothache	Powdered root and leaf are mixed with ginger powder and kept in the mouth; root powder burnt on charcoal and the mouth fumigated[2]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Carrisa edulis (Forssk) Vahl (Apocynaceae)	Agam	Buda (evil eyes)	Ground roots are mixed with fluid and drunk[3]
		Gingivitis	Roots are burned and smoke inhaled[3]
		Malaria	Roots are soaked in unfermented local beer and drunk[2]
		Psychiatric problems	Roots are burned and smoke inhaled[3]
		Rectal prolapse	Powder of the semi-parasite is applied[2]
Clerodendron myrcoides (Hochst) R.Br. ex. Vatke (Verbenaceae)	Surabatri; misrich; mestefakir	Measles	Residue from decoction is buried under skin of the arm for prophylaxis[2]
		Poison antidote	Decoction of the root is drunk[1]
Commiphora abyssinica Engl. (Burseraceae)	Kerbe	Antiseptic	Used after dissolving in water[4]
		Pleasant smell	Resin[4]

Commiphora abyssinica (Continued)		Promotion of lactation	Partially mineralized wood applied to the breasts[4]
		Skin infection	Partially mineralized wood applied to affected area[5]
Commiphra resiniflua Hartelli (Burseraceae)	Ankket	Hepatotonic	Unspecified[8]
		Taeniasis	Hot water extract of the resin drunk[8]
Coriandrum sativum L. (Umbelliferae)	Dimbelal	Colic; stomach ache	Leaves are added to aromatic herb and chewed[4]
		Oxytocic (For quick delivery)	Powdered root is worn around the waist[2]
		Taeniasis	Powdered fruit is made into sauce and eaten[2]
Croton macrostachys Del. (Euphorbiaceae)	Tambuk; bisana	Aphasia	Powder of the semi-parasite on the plant is pasted with honey and butter and eaten[2]
		Ascariasis	Powdered bark is baked with flour and eaten[2]
			Ground bark is mixed with water and drunk[3]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Croton macrostachys (Continued)	Tambuk; bisana	Ascariasis	Ground leaves are mixed with butter and pepper and swallowed[3]
			Seeds are ground, mixed with bread and eaten[3]
		Constipation	Leaves are ground, mixed with water and drunk[3]
		Eye disease	Leaf juice is applied as drops[2]
		Hemorrhoid	Leaves inserted into nostrils and the anus[1]
		Induction of abortion	Seeds are eaten[1]
		Purgative	Croton oil[1]
		Ringworm	Leaves are rubbed onto affected area[3]
		Taeniasis	Crushed leaves and seeds are mixed with water and drunk[1]

Croton macrostachys - (Continued)		Taeniasis	Ground bark is soaked overnight filtered and the solution drunk[5]
			Mixed with other tanaecides and used[4]
		Stomach ache	Ground roots are mixed with water and drunk[3]
		Venereal disease control	Fruits are eaten; root decoction is drunk[1]
Cucumis prophetarum L. (Cucurbitaceae)	Yemdir embuay	Bad breath	Roots are chewed and kept in the mouth for a while[3]
		Cough	Juice from leaves is mixed with fluid and drunk[3]
		Diarrhea	Ground roots are mixed with fluid and drunk[3]
		Ear problem	Ground roots are mixed with fluid and applied to ear[3]
		Gonorrhea	Ground roots are mixed with tella and swallowed[3]
		Rabies in dogs	Ground roots are mixed with fluid and given by mouth[3]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Cucumis prophetarum (Continued)	Yemdir embuay	Stomach ache	Roots are chewed and swallowed; ground roots mixed with water and drunk[3]
		Toothache	Part of the plant is chewed and kept in the mouth for a while[3]
		TB/skin cancer	Ground roots are made into ointment and applied to affected area[3]
Cucurbita pepo L. (Cucurbitaceae)	Duba ferre	Antipyretic	Unspecified[8]
		Taeniasis	Seeds are eaten[5]
Cussonia sp (Araliaceae)	Getemie	Filariasis	Unspecified[8]
		Taeniasis	Hot water of extract of the bark drunk[8]
Cymopogon citratus (DC.) Stapf (Lemon grass) (Gramineae)	Tej sar	Flavor	Added to kocho[4]
		Stomach ache; smallpox; common cold	Leaves are chewed; leaves are boiled and drunk[5]

Cyndon dactylon (L.) Pers. (Graminae)	Serdo	Taeniasis	Powdered whole plant is pasted in honey and taken[8]
		Uricosuric	Unspecified[8]
Datura stramonium L. (Solanaceae)	Etse faris; Astenagir	Eye disease (crying eyes)	Leaf juice is applied[2]
		Bad breath	Seeds are frayed and the smoke inhaled[1]
		Fungus infection of of the head	Leaves are crushed and applied to the head[1]
		Mumps	Fresh fruit is tied onto affected area[2]
		Relief of tooth ache	Vapor of boiled seeds is inhaled[1]
		Rheumatic pain	Smoke from the combined root, stem and leaf and powder is inhaled[2]
		Treatment of burn	Sap of crushed leaves is applied to affected area[1]
		Wound	Leaves are crushed and applied to affected area[3]

(Continues)

TABLE 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Dodonea viscosa (L.) Jacq (Sapindacea).	Kitkita	Snake bite	Unspecified[8]
		Taeniasis	Leaf juice or paste in honey taken[8]
Echinops spp (Compositae)	Keberitcho	Constipation	Powdered root is mixed with onion juice and drunk[2]
		Headache	Powdered root is mixed with garlic and pepper, and pasted onto the head with butter and honey[2]
		Heart pain	Polished seeds are eaten[2]
		Stomach ache	Roots are chewed[4]
		Typhus	Roots are burnt and the smoke inhaled[4]
Echinops gigantea A. Rich (Compositae)	Dendero	Hemorrhoid	Unspecified[8]
		Taeniasis	Root paste in honey is taken[8]

Embelia schimperi Vatke. (Myrsinaceae)	Enkoko	Taeniasis (powerful purgative)	Crushed seeds are mixed with water and drunk[1]
		Disinfectant	Unspecified[8]
Erythrina abyssinica Lam ex. DC. (Leguminosae)	Sono	Laxative	Decoction of leaves and young branches is drunk[1]
Eucalyptus glabra Labille (Myrtaceae)	Bahr zaf	Cold	Vapor from boiled leaves is inhaled[7]
Euphorbia abyssinica Gml (Euphorbiaceae)	Kulkwal	Ascariasis	Milky juice is mixed with teff bread and eaten[2,3]
		Gonorrhea	Milky juice is mixed with milk and drunk; milky juice mixed with bread and eaten; powdered dried and milky juice is mixed with flour of teff and coffee and drunk; milky juice mixed with flour of barley and wheat, and eaten[3]
		Insect pests	Milky juice is sprayed[3]
		Leprosy	Milky juice is applied to affected area, or eaten with bread[3]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Euphorbia abyssinica (Continued)	Kulkwal	Mitch	Latex is mixed with brown teff flour, made into a porridge and eaten[2]
		Syphilis	Powdered latex is mixed with honey and eaten[2]
		Rabies	Milky juice is mixed with fluid and drunk, or mixed with bread and eaten[3]
		Rabies in dogs	Milky juice is made into a pill and given orally[3]
		TB/skin cancer	Powdered root is made into ointment and applied to affected area[3]
		Tinea decalvans	Latex is mixed with crushed garlic, salt and wheat flour and applied to affected area[2]
		Toothache	Gum is tattooed with latex powder[2]
		Wound	Milky juice is applied to affected area[3]

Ficus palmata Forssk. (Moraceae)	Beles	Breast swelling	Leaves are boiled and bandaged to affected area[2]
		Bladder stone; gout	Unspecified root and leaf preparation is taken[2]
		Cough	Powdered leaf is stuffed in goat's lung and eaten[2]
		Eye disease (unspecified)	Latex is mixed with honey and applied[2]
		Eye lash and/or eye brow growth stimulation	Latex is mixed with child's urine and applied[2]
		Hemostatic (stab wound; traumatic injury)	Fresh, pulverized leaf is applied to wound[2]
		Joint immobility	Boiled leaves are bandaged to affected area; mead decoction of root is drunk[2]
		Menorrhagia	Bark is tied around the waist[2]
		Otitis media	Small amount of leaf juice or latex is applied[2]
		Oxytocic (Expulsion of the placenta)	Hot decoction of the leaf is applied to the vagina; mead decoction of the leaf drunk, while hot; vagina is fumigated with steam from boiling leaf[2]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Ficus palmata (Continued)	Beles	Swelling	Fresh pulverized leaves are bandaged to affected area[2]
		Toothache	Root chewed, or powdered root is mixed with garlic and kept in the mouth[2]
		Urinary retention	Mead decoction of the root is used as a wash[2]
Foeniculum vulgare Mill (Umbelliferae)	Insilal	Dysentery; gonorrhea; stomach ache	Leaves are chewed, or boiled in water and drunk[5]
Galium sp. (Rubiaceae)	Ashkit	Taeniasis	Leaf juice in honey is taken[8]
Glinus lotoides Loefl (Sapindaceae)	Metere	Ascariasis; taeniasis	Seeds are soaked overnight and the solution drunk the next morning[5]
		Diabetes	Unspecified[8]
Grewia ferruginea Hochst ex A. Rich (Tiliaceae)	Lenkkuata	Scabies	Unspecified[8]
		Taeniasis	Bark powder paste in aqueous sunflower extract is taken[8]

Guizotia scabra (Vis.) (Chiov.) (Compositae)	Mettche	Antimicrobial	Unspecified[8]
		Taeniasis	Root powder paste in aqueous sunflower is taken[8]
Hagenia abyssinica (Bruce) Gmel. Syn. *Brayera* anthelminthica (Rosaceae)	Kosso	Eye disease	Powdered flower is mixed with goat's fat and the eyes are fumigated with the smoke[2]
		Hypertension	Unspecified[8]
		Scabies	Horse is fumigated with smoke form the bark[2]
		Taeniasis	Crushed flowers are soaked overnight in water, local beer, or mead (tej), filtered and drunk in the morning[5]
Helichrysum schimperi Sch. Bip. Ex Rich (Compositae)	Serareti	Anthelminthic	Unspecified[8]
		Taeniasis	Hot water extract of the root is taken[8]
Impatiens capensis (Jewelweed) (Balsaminaceae)	Telenj	Fracture	Plant is tied to the ear[3]
		Hypertension	Root is tied to body parts[3]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Impatiens capensis (Continued)	Telenj	Mitch	Roots are smoked followed by sleep[3]
		Poisoning	Roots and leaves are boiled in water and drunk[3]
		Wound	Ground roots and leaves are applied to affected area[3]
Ipomoea sinensis (Convolvulaceae)	Hatatchello	Relief of stomach ache	Roots are chewed and the juice swallowed[1]
Jasminum floribundum R.Br. ex, Frens. (Oleaceae)	Timbelal	Eye disease	Solution of plant is applied to the eye[3]
		Rabid dog	Ground roots are mixed with bread and fed[3]
		Taeniasis	Plant is burned and smoke inhaled[3]
		Wound	Plant is burned and smoke inhaled[3]
Kalanchoe petitiana A. Rich.(Crassulaceae)	Indaula	Abdominal dropsy	Whole plant is infused in cow's urine and drunk[2]

Kalanchoe petitiana (Continued)		Ascariasis	Ground roots is mixed with fluid and drunk, or root is boiled with chick-pea and the chick-pea eaten with local bread (injera)[3]
		Epilepsy	Ground roots are mixed with fluid and drunk[3]
		Labor	Powdered root is mixed with molten butter and eaten[2]
		Running nose/nose with mucoidal pus	Fresh pulverized root or powder is placed in the nose[2]
		Swelling	Crushed leaves are placed on affected area; powdered root is applied to affected area[3]
		Trachoma	Powder from dried young shoot juice is applied to affected area; sap mixed with dry excrement of dove and applied to affected area[2]
Lageneria siceriara (Moli) Standley or *Lageneria vulgaris* Ser. (Cucurbitaceae)	Merara Kil	Buda (evil eye)	Gourds are kept in doorways[4]
		Otitis media	Leaf juice is applied to affected ears[2]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Laggera tomentosa A.Rich Sch. Bip.ex. Oliv. (Compositae)	Keskaso	Digestant	Leaves are eaten to facilitate digestion after eating raw meat[4,5]
		Mitch	Unknown plant part and preparation is used[4]
		Oxytocic	Fresh and pulverized leaf tied around the waist[2]
		Toothache	Root is held between the teeth[2]
Lantana trifolia (Verbenaceae)	Kase	Colds	Leaves are boiled and solution drunk[4]
		Ringworm	Leaves are boiled and applied to affected area[4]
Leonotis vetulina Fenz (Labiatae)	Ras-Kimr (Yeferesunk)	General abdominal pain; ascariasis	Leaves are boiled and solution drunk[4]
Lepidium sativum L. (Cruciferae)	Feto	Abdominal pain; colic; dysentery; swellings	Ground seeds are chewed or eaten with food, applied to affected area, or smoked[2]

Lepidium sativum (Continued)		Aphrodisiac; gastritis	Seeds are pounded with ginger, black pepper, black cumin, pasted with honey and eaten[2]
		Headache; ringworm; buda beshita; mitch	Depending on the type of disease, seeds are prepared and taken[4,5]
Lycospericon esculanta Miller (Solanaceae)	Timatim	Treatment of gonorrhea	Leaves are mixed with leaves of *F. vulgare*, boiled and drunk[1]
Maesa lanceolata Forssk. (Myrsinaceae)	Suwaria; kelewa	Fish poison and molluscucide	Extract of leaves is applied[1]
		Malaria	Fresh pulverized bark is boiled in water and drunk[2]
		Skin infections	Crushed seeds are fried in butter and applied to affected area[1]
		Taeniasis	Crushed seeds mixed are with water and drunk; oily extract from fruits is taken[1]
Maytenus senegalensis Exsell. (Celastraceae)	Kebkeb	Treatment of cancer	Crushed bark is mixed with water and drunk[1]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Milletia ferruginea (Hochst.) Bak. (Leguminosae)	Birbira (Asa maskeriya)	Fish poison	Crushed bark and mature fruits are applied to to the surface of water[1]
		Treatment of skin infection	Crushed seeds are fried in butter and applied[1]
Myrica salicifolia Hochst. ex A. Rich.. (Myricaceae)	Shinet	Epilepsy	Mead decoction of bark is drunk[2]
		Eye disease	Bark infusion is filtered and applied as drops[2]
		Febrifuge	Powdered bark is pasted with honey and eaten in the sun while drinking local beer[2]
		Headache	Head is washed with bark decoction[2]
		Infertility	Powdered bark is boiled in water and drunk[2]
		Night blindness	Powdered bark is charred with mascara and applied[2]
Myrsine africana L. (Myrsinaceae)	Ketchemo	Ascariasis; fever; stomach ache; taeniasis	Seeds are soaked overnight and the solution drunk the next morning[5]

Myrtus communis L. (Myrtaceae)	Addes	Dysentery	Dried leaves are crushed, boiled in water and and drunk[4,5]
		Febrifuge	Infusion of the leaf powder is squeezed out into the mouth[2]
		Fragrance	Mixed with butter and applied to hair as pomade by women[4]
Nicotiana glauca (Solanaceae)	Tumbaku	Control of leeches	Leaves are crushed and aqueous decoction is applied to wash area where suckers are attached[1]
Nigella sativa L. (Ranunculaceae)	Awasida	Common cold	Fried seeds are wrapped in a piece of cloth and sniffed[2]
		Hemorrhoid	Powdered seed is applied[2]
		Migraine	Powdered seed is taken by mouth[2]
		Relief of stomach ache	Crushed seeds are mixed with water and the suspension drunk[1]
		Rheumatic pain	Powdered seed is mixed with milk and taken[2]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Ocimum sp. (Labiatae)	Dama kese	Cough; cold; headache	Squeezed out juice from leaves is sniffed[4]
		Eye infection	Leaves are crushed and boiled in water, and the solution applied[4]
		Hematuria	Leaves are crushed and boiled in water and the solution is drunk[4]
		Mitch	Squeezed out juice from leaves is drunk[5]
		Smell	Leaves are inserted into the nostrils[4]
Otostepa integrifolia Benth. (Labiatae)	Tengut	Insecticide; disinfectant	Smoke of burning branches and leaves is used[1]
Oxalis anthelminthica (Oxalaceaea)	Mitchamitcho	Taeniasis	Roots are crushed and swallowed, or crushed roots are mixed with water and drunk[1]
Phytolacca dodecandra L.Herit (Phytolaccaceae)	Endod	Abortifacient	Crushed roots are mixed with water and drunk to induce abortion in animals[1] ; cooled decoction of powdered root is drunk to expel mummified fetus[2]

Phytolacca dodecandra (Continued)	Ascariasis	Ground fruits are soaked in water and the solution drunk[5]
	Eczema	Affected part is washed with infusion of fresh pulverized leaf, followed by application of *Euphorbia abyssinica*[2]
	Gonorrhea	Crushed roots are mixed in water and the solution drunk[1]
	Infertility	Root is coated with sheep's bile fluid, chewed and the juice swallowed; root juice of the male plant is swallowed[2]
	Liver disease	Plant parts are mixed with water and drunk[3]
	Malaria	Crushed roots are mixed with water and drunk[1]
	Rabies	Same as for malaria[3]
	Soap substitute	Dried and ground fruits are used[1]
	Syphilis	Root (bark removed) powder is mixed with water and drunk[2]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Pilostigma thonninngii (Leguminosae)	Amam Gemel	Uneasiness and sweating	Solution of leaves is applied to the body, or the body is fumigated with the smoke of the leaves[1]
Plantago lanceolata L. (Plantaginaceae)	Gorteb	Antibacterial	Unspecified[8]
		Taeniasis	Whole plant powder water extract is taken[8]
Plumbago zeylanicum L. (Plumbaginaceae)	Amerra	Abdominal colic	Root smoke is inhaled[2]
		Eye disease	Roots are soaked in butter and applied to the eyes[3]
		Stomach trouble	Smoke from bark is inhaled from traditional tobacco pipe[2]
		TB	A piece of root or leaf is inserted into affected area by making incision[3]
		Toothache	Smoke from root or root bark is inhaled from traditional tobacco pipe[2]

Podocarpus grancilicor Pilg. (Podocarpaceae)	Zigba	Eye disease	Powder from resin is applied for *bilz, biltz letalebet*[2]
		Sunburn	Inside of seeds is ground and applied to affected area[3]
		TB of head	Inside of seeds is ground, made into ointment with fat and applied to affected area; squeezed-out juice from leaves is mixed with butter and applied to nostrils[3]
		Vitiligo	Powdered fruit is mixed with chicken fat and applied to affected area[2]
Prunus persica (L.) Stokes (Rosaceae)	Kok	Inflammation	Unspecified[8]
		Taeniasis	Leaf powder paste in aqueous linseed extract is taken[8]
Punica granatum L. (Puniceae)	Roman	Cough	Smoke from the bark is inhaled from tobacco pipe[2]
		Diarrhea	Decoction of root and leaves is drunk[2]
		Taeniasis	Leaves are crushed in water and drunk[1]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Pycnochachys sp. (Labiatae)	Famfa	Eye infection	Eyes are rinsed with concoction[4]
		Dysentery	Concoction from leaves is boiled in water and drunk[4]
		Mitch	Body is washed with concoction[4]
Rhamnus staddo A. Rich (Rhamnaceae)	Ttedo	Anthelmintic	Unspecified[8]
		Taeniasis	Aqueous or hydro-alcoholic leaf powder extract is taken[8]
Ricinus communis L. (Euphorbiaceae)	Tchakama; Gullo	Antibacterial	Unspecified[8]
		Purgative	Unspecified preparation of the seed oil is used[11]
		Taeniasis	Root powder paste in aqueous sunflower extract is taken[8]
Rubia discolor Turcz (Rubiaceae)	Encheber	Cough; cancer	Roots are boiled and eaten[4]

Rubus sp. (Rosaceae)	Injore	Cough; rheumatism	Roots are boiled in water and the solution drunk[4]
Rumex nepalensis Mooney non Spreng. (Polygonaceae)	Tult	Amebiasis	Ground roots are mixed with fluid and drunk[3]
		Tonsilitis	A piece of stem is tied on the neck; ground stem is made into ointment and applied externally to affected area[3]
		Uterine bleeding	Ground roots are mixed with water and drunk[3]
Rumex hequariti (Polygonaceae)	Shumbubata	Rheumatism	Aqueous root extract is drunk[1]
Ruta graveolens L. (Rutaceae)	Tena adam	Stomach ache; headache; mitch; megagna beshita; warding off evil spirits	Leaves are chewed alone or with tikur azmud (*Nigella sativa)*; added to *wot*, *teff*, coffee tea[4]
Salsola somalinensis N.E. Br. (Chenopodiaceae)		Taeniasis	Roots are chewed and juice swallowed[12]
Seasum indicum L. (Pedaliaceae)	Selit	Relief of ear ache and hearing problems	Oil is extracted from seeds and applied to ears[1]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Securidaca longepedunculata Frens (Polugalae)	Etse manahe; temenai	Cough	Smoke from the root is inhaled from traditional tobacco pipe; root smoke is inhaled through the nostrils[2]
		Gonorrhea; leprosy	Powdered root is pasted with honey and taken with fresh milch of milk[2]
		Syphilis	Roots are boiled and the solution drunk[4]
		Taeniasis	Root powder paste in honey is taken [8]
		To keep away evil spirits	Pungent smoke from burnt plant is applied[4]
Sida ovata Forsk. (Malvaceae)	Chifrig	Buda; cough	Ground roots are mixed with fluid and applied to the nostrils[3]
		Fracture	Crushed roots are applied to affected area and tied[3]
Silene macroselen Steud. ex. Rich. (Caryophyllaceae)	Wogert	Evil spirits (zar, jin, ganen, etc.)	Root or wood is burnt in house[5]
		Taeniasis; ascariasis	Roots are ground to watery paste and eaten[4]

Smilax goetzeana Engler (Smilaceae)	Yahiya enkoko	Antispasmodic	Unspecified[8]
		Taeniasis	The root powder paste is taken[8]
Solanum campylocanthum Hochst. ex. A. Rich. (Solanaceae)	Embway	Bite of leech	Juice is squeezed from roots and drunk[3]
		Bleeding wound	Leaves are crushed and applied to affected area[3]
		Difficulty urinating	Roots are boiled in *tej* and the solution drunk[3]
		Expulsion of placenta	Leaves are boiled in water and steam inhaled, and also leaves placed on vagina[3]
		External swelling	Leaves and fruits are crushed and applied to affected area[3]
		Stillbirth	Ground roots are mixed with water and applied as a bath[3]
		Stomach ache	Roots are chewed and swallowed[3]
		Swollen breast; muscle spasm	Crushed leaves are applied to affected area[3]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Solanum campylocanthum (Continued)	Embway	Under-wetness in in children	Ground roots or leaves are mixed with water and applied as a bath[3]
Solanum marginatum L. (Solanaceae)	Zerch embway gebar embway; ye dega embway	Cough	Powdered seed is boiled and taken[2]
		Menorrhagia	Powdered root is mixed with honey water and taken[2]
		Scabies	Affected area is washed with water solution in which leaves and roots have been soaked[3]
		Taeniasis	Root powder in aqueous sunflower extract is taken[8]
		Toothache	Powdered seed is mixed with butter and melted on fire and applied as drops to the base of the aching teeth[2]
		Uterine bleeding	Patient is sat on the leaves[3]

Stephania abyssinica (Dillon & A. Rich.) Walp. (Menispermaceae)	Ye ayet hareg	Anthrax	Root juice is given to cattle[2]
		Aphrodisiac	Fresh pulverized root is infused in mead overnight and drunk[2]
		Flatulence	Cautery is applied on the abdomen with the the flame of burning root[3]
		Frequent miscarriage/ neonatal death	Powdered root is mixed with roasted barley and eaten[2]
		Kuruba	Ground roots are mixed with fluid and drunk[3]
		Rabies	Powdered root is mixed with cow's milk and drunk[2]
Stylochiton kerensis N.E. Brown (Araceae)	Amoch	Abortifacient	Fruit powder mixed with garlic juice is taken[2]
		Aphrodisiac	Fried fruit steeped is in water overnight and drunk in the morning; powdered whole plant is taken mixed with honey or mead to arouse sexual desire[2]
		Bad breath	Juice from warmed stem and fruit is held in the mouth[2]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Stylochiton kerensis (Continued)	Amoch	Bad odor from the mouth or ears	Juice from above is applied as drops[2]
		Bruised or discolored eyes	Crushed unspecified part is applied[2]
		Chloasma	Powdered root is mixed with residue from "araki" distillation and applied to affected area; powder of the whole plant is mixed with garlic juice is applied[2]
		Diuretic	Powdered whole plant is mixed with mead or honey and taken[2]
		Ear ache	Juice from fresh pulverized fruit is applied as ear drops[2]
		Eczema	Fresh pulverized aerial parts are mixed with garlic puree and bandaged onto affected area[2]
		Eye bruise	Root juice is applied[2]

Stylochiton kerensis (Continued)		Nasal lesion; mucoidal discharge; bad odor	Fresh pulverized juice is applied[2]
		Snake bite	Fresh pulverized root and leaf, or powder is mixed with mead and taken, or bandaged to the site[2]
		Sperm insufficiency	Powdered root is mixed with local beer and taken[2]
		Topical ulcer	The same preparation is used as for eczema[2]
Syzgium guenensis (Willd) DC (Myrtaceae)	Dokkma	Anthelminthic	Unspecified[8]
		Taeniasis	Root powder hot water extract is taken[8]
Taverniera abyssinica A. Rich. (Fabaceae)	Dingetegna	Sudden disease; headache; stomach ache	Roots are chewed and swallowed[4,5]
Terminalia brownii Fresen.=*T. cyclotera* R. Br. (Combretaceae)	.Weyba	Hepatitis	Crushed bark is mixed with water and drunk[1]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Thalictrum rhynocarpum Dill. & A. Rich. (Ranunculaceae)	Sre bizu	Menorrhagia	Powdered root is pasted with honey and swallowed[2]
Thymus serrulatus Hochst (Labiatae)	Tossign	Acne; chloasma	Whole plant decoction is applied[2]
		Antispasmodic; vomitive	Unspecified plant part and preparation is used[4]
		Ascariasis	Whole plant is infused overnight and drunk[2]
		Biliousness	Water or mead decoction is drunk[2]
		Cough; head ache	Leaves are boiled as tea and drunk[5]
		Emenagogue	Powdered whole plant is mixed with water or mead and drunk; the vagina is fumigated with smoke from the powder[2]
		Excessive menstruation	Decoction of the whole plant is drunk and the stem inhaled; powdered leaf is mixed with mead and drunk; powdered seed decoction is drunk[2]

Thymus serrulatus (Continued)		Flavor	Added to *wot* and butter[4]
		Hepatotonic	unspecified[8]
		Leprosy	Plant is boiled and body steam-fumigated[2]
		Mental illness	Water or mead decoction of the whole plant is taken; body is washed with the decoction[2]
		Rheumatic pain	Root or aerial part is chewed and the juice swallowed[2]
		Stomach ache	Unspecified part is brewed and drunk[4]
		Taeniasis	Powdered leaf paste in honey is taken[8]
		Tinea captis (favus)	Whole plant is boiled in milk, left overnight and drunk[2]
		Toothache	The same as for rheumatic pain[2]
		Vermifuge	Aerial part is chewed and the juice swallowed[2]
Verbascum sinaticum Benth. (Scrophulariaceae)	Ye feres zeng; terramka; ketetina	Abdominal dropsy	Fresh pulverized root is boiled in water, mixed with honey, or tea and drunk[2]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and *mode of administration*
Verbascum sinaticum (Continued)	Ye feres zeng; terramka; ketetina	Anthrax	Crushed roots and leaves are mixed with honey and eaten[1]
		Buda	Ground roots are mixed with fluid and drunk[3]
		Diarrhea	Same as for *buda*[3]
		Fever	Smoke is inhaled[3]
		Heart pain	No plant part or preparation is specified[2]
		Impotence	Same as for *buda*[3]
		Infertility (to open blocked womb)	Same as for abdominal dropsy[2]
		Oxytocic	Powdered root is mixed with water and drunk[2]
		Post partum bleeding	Crushed leaves are inserted in vagina[1]
		Stabbing pain	Unspecified plant part is powdered with niger and swallowed[2]

Verbena officinalis L. (Verbenaceae)	Attutch	Dysentery; digestive after eating raw meat	Dried and crushed leaves are dissolved in water and drunk[4,5]
		Eczema	Fresh pulverized root is applied to affected area[2]; leaves or roots are made into ointment and applied to affected area[3]
		Eye disease	Juice of roots is applied to the eyes[3]
		Heart disease	Roots are boiled in *tej* and drunk[3]
		Heart pain	Fresh pulverized root and leaf are boiled in mead and drunk; mead decoction of the fresh pulverized root and leaf is drunk[2]
		Indigestion	Fresh pulverized root and leaf are boiled in mead and drunk[2]
		Induction of diarrhea and emesis to relieve indigestion	Root and leaf are infused in mead and drunk[2]
		Insomnia	Powdered root is mixed in water and drunk[2]
		Liver disease	Leaves or roots are squeezed and the juice swallowed[3]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Verbena officinalis (Continued)	Attutch	Malaria	Root and leaf powder is mixed in water and and taken[2]
		Mumps	Powdered leaf is pasted with water, mixed with salt and applied to affected area[2]
		Snake/rabid dog bite	Affected part is scorched and then mead infusion of fresh pulverized root is taken, and wound washed with same[2]
		Soar throat	Water solution of charred and powdered root, or decoction of the leaves is gargled for blocked throat[2]
		Stomach ache	Roots are chewed and the juice swallowed[3]
		Stomach trouble	Mead decoction of the root and leaves are drunk[2]
		Tongue disease	Warm decoction of leaves is gargled[2]
		Tonsilitis	Ground roots are mixed with fluid and drunk[3]

Verbena officinalis (Continued)		Toothache	Leaf decoction is gargled[2]
		Treatment of ascariasis; burns; chronic respiratory ailments	Leaves with unspecified preparation are used[4]
		Wound healing	Roots are inserted into affected area[3]
Vernonia amygdalina Del (Compositae)	Grawa	Ascariasis	Dried leaves are boiled and the solution drunk[4]
		Control of excessive bleeding during menstruation	Leaves are crushed in water and drunk[1]
		Wound	Fresh pulverized leaves are infused in *areke* (local alcoholic drink) and drunk[2]
Withania somnifera (L.) Dunal (Solanaceae)	Gizawa; agol	Evil spirit exorcism	Powdered root is fermented in the sun, mixed with edible oil and applied as nasal drop; powdered root is mixed with mead and drunk[2]
		Joint infection; arthritis	Crushed leaves are applied to affected area as a poultice[1]

(Continues)

Table 1 (Continued)

Latin name (Plant family)	Vernacular name	Purported use	Plant part used, method of preparation and mode of administration
Withania somnifera (Continued)	Gizawa; agol	Malaria	Root is mixed with pepper, chewed and the juice swallowed[2]
Zehmeria scabra (L.f.) Sonder (Cucurbitaceae)	Hareg resa; Este sabek	Amenorrhea	Unspecified preparation of the leaf is mixed with a paste of red pepper and eaten[2]
		Intelligence booster	Powder of the semi-parasite is mixed with bile fluid and buried under the skin of the forehead[2]
		Mitch or *giriffta*	The leaves are squeezed and the juice drunk; leaves are chewed and the juice swallowed; the leaves are burnt and the smoke inhaled; the leaves are boiled and drunk as tea; the leaves are boiled in water and bathed in the solution; the leaves are boiled in water and the steam inhaled; the leaves are crushed and the juice applied to the skin[3]
Zingiber officinalis Rosc. (Zingiberaceae)	Zingibil	Relief of stomach ache	Rhizome is chewed and swallowed[1]

[1] Wilson & Gebre Mariam, 1979

[2] Abebe & Ayehu, 1993
[3] Abebe, 1986
[4] Kloos, 1976
[5] Kloos *et al.*, 1978
[6] Pankhurst, 1990
[7] Strelcyn, 1973
[8] Desta, 1995
[9] Hartwell, 1967
[10] Asres *et al.*, 1986
[11] Getahun, 1976
[12] Woldu & Abegaz, 1990

POTENCY VARIATIONS OF HERBS

The potency of a medicinal herb depends on a host of factors, which may sometimes seem subtle. The quantitative chemical constitution of a plant is a function of the part, the age, the growing conditions, the geographical location and the season of collection of the plant. Within the same plant species collected at different times and under different conditions, genetic variations might occur. This in turn leads to different quantities of active ingredients and therefore different potencies of medicinal plants, especially in wild growing varieties. The processing of a plant material is also a significant factor, which contributes to its quality and potency. Some constituents are heat labile, and thus a plant may require drying at low temperatures, while for others drying for a prolonged time might enhance moisture-mediated degradation of the active ingredients. Once a plant material is collected or purchased, its efficacy depends on the amount used, the method of preparation adopted and the manner in which the final product is used.

For most Ethiopian medicinal plants the dosages are not known, or if known vary from vendor to vendor, or from user to user. Most medicines, like other goods, are sold not by weighing, but by handfuls, canfuls, or simply by piling up. Likewise, the method of preparation is not standardized. This situation is bound to lead to sub-therapeutic treatment in low doses and adverse events in the case of high doses, the principal untoward effects with the latter being chronic toxicity problems, which are not as evident as the manifestations of immediate toxicity. This is in particular true for such chronic remedies as taenicides. For example, perusal of Table 2 indicates the wide variation of individual doses for taenicides and other remedies, based on a market survey conducted in 1978. Considering *H. abyssinica* (*kosso*) as an example, the dosage varies by as much as about three-fold (300 per cent). This discrepancy is indicative of two problems; first, the effective dose is not known by the consumers, and secondly the higher doses and the attendant toxicity might have deleterious effects on the consumer. The method of preparation for most medicinal herbs is not also standardized.

In a recent human study on 33 Ethiopian traditional taenicidal herbal drugs, the respective median effective doses were determined (Desta,1995).Starting out with traditionally used unspecified amounts (doses), appropriately made into paste with honey, the taenicides were administered orally to a group of human volunteers. The doses were titrated up or down depending on the responses, until partial or total tapeworm expulsion was observed. Table 3 shows the data obtained in this manner for the10 most frequently used local taenicides. Examination of the table shows a decreasing order of potency, with *Echinops gigantea* being the most potent, and *Plantago lanceolata* the least potent, and the rest in between. The median effective dose is the amount needed to cause a partial or total ejection of the parasite in 50% of the test subjects. The worm expulsion time refers to the time required to effect a partial or total ejection of the worm after administration of the herb. The rank order in terms of increasing worm expulsion time was determined to be: *C. pepo, E. schimperi, E. gigantea, T. serrulatus, H. abyssinica, M. africana, M. lanceolata, G. lotoides, C. dactylon* and *P. lanceolata.* In the same study, the toxicity pattern of these taenicides was investigated in mice. The LD_{50}s of the 10 taenicidal herbs is shown in Table 4. The LD_{50} is the lethal dose (amount)that killed 50% of the test mice. It is observed from these data that for the aqueous extracts, the most potent herb *E. gigantea* also happens to be the most toxic of the 10 taenicides. In general, when higher potency, lower toxicity and shorter worm expulsion time are considered a decreasing order of preference is obtained as: *E. schimperi, C. pepo, T. serrulatus, H. abyssinica, M. africana, M. lanceolata, C. dacytlon, E. gigantea, G. lotoides* and *P. lanceolata*.

While the above study appears to be significant, it does not show the correlation between the traditional dose and preference of the public versus the data obtained in this investigation. Similar studies for other types of medicinal plants are also required, in order to determine their potency and toxicity. Such investigations become all the more important, when one considers the variable doses of

TABLE 2. DOSAGE VARIATION OF SOME ETHIOPIAN HERBS[1]

Medicinal plant name	No. of samples	Mean weight (Gram)	Dose range sold (Gram)
Hagenia abyssinica	11	23.6	15.0-49.4
Embelia schimperi	11	29.3	17.1-55.9
Glinus lotoides	12	25.6	10.7-36.8
Croton macrostachys	12	35.0	18.3-78.2
Myrsine africana	9	23.0	9.3-37.7
Thymus serrulatus	4	24.3	6.0-31.6
Securidaca longepedunculata	3	4.3	3.1-5.2
Silene macroselen	8	20.7	9.3-31.9
Withania somnifera	12	41.9	17.4-80.5
Echniops sp.	8	38.3	19.8-66.7

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[1] Adapted from market survey conducted by Kloos *et al.* (1978)

Table 3. Therapeutic effectiveness of local taenicidal herbs arranged in decreasing order of potency[*]

Local Name	Scientific Name	Plant Part	Mean effective dose (g)	Worm expulsion time (h)
Dendero	*Echinops gigantea*	Root	7.84±1.04	10.2±2.0
Enkoko	*Embelia schimperi*	Fruit	8.23±1.50	10.8±1.0
Kosso	*Hagenia abyssinica*	Flower	12.5±2.2	11.3±1.4
Metere	*Glinus lotoides*	Fruit	15.6±1.9	12.4±1.8
Tossign	*Thymus serrulatus*	Leaf	20.6±2.1	11.2±1.1
Ketchemo	*Myrsine africana*	Fruit	30.2±2.2	12.1±2.1
Serdo	*Cynodon dactylon*	Whole plant	35.7±1.5	14.8±0.8
Kelewa	*Masea lanceolata*	Fruit	40.9±3.2	12.4±2.6
Duba	*Cucurbita pepo*	Seed	42.8±5.3	10.1±1.7
Gorteb	*Plantago lanceolata*	Whole plant	60.2±4.9	18.0±2.4

[*] Adapted from Desta, 1995 (See this ref. for further details).

Table 4. Toxicity data in mice of traditional taenicidal herbs[*]

Plant scientific name	Plant Part	LD_{50} (mg/kg)	
		Aqueous extract	Hydro-alcoholic extract
E. gigantea	Root	78.92±4.25	70.23±3.84
E. schimperi	Fruit	3642±328	4237±278
G. lotoides	Fruit	532.6±28.3	1811±108
H. abyssinica	Flower	2014±301	1980±179
T. serrulatus	Leaf	4682±406	4876±309
M. africana	Fruit	4478±392	4692±291
C. dactylon	Whole plant	4932±389	3822±319
M. lanceolata	Fruit	4847±450	3218±399
C. pepo	Seed	>5000	>5000
P. lanceolata	Whole plant	2980±198	3350±326

[*] Adapted from Desta, 1995 (See this ref. for details)

different Ethiopian medicinal plants. Standardization of herbal products is important from the standpoints of safety and efficacy. It ensures effectiveness, while minimizing toxicity. Basic data, like the ones obtained for local taenicidal agents, are required for other Ethiopian herbs, so that they can be utilized as indicators for standardization.

♣♣♣ Chapter 3 ♣♣♣

MONOGRAPHS OF SELECTED ETHIOPIAN MEDICINAL PLANTS

The following medicinal plants were selected for further elaboration, because there are sufficient literature data to support the validity of their purported uses in Ethiopia, by virtue of the fact they have been used for similar purposes in other cultures and countries, or there are scientific studies to confirm their activity. Thus reading the following monographs must be coupled with perusal of Table 1.

Allium sativum

Common name: Garlic

Vernacular name: Netch Shinqurt

Allium sativum is a perennial that grows to about 27 to 75 cm. The garlic bulb is usually a compound bulb, with a silky white or green skin. The main bulb consists of several secondary bulbs called cloves. Central Asia is believed to be the origin of garlic; it is now cultivated worldwide.

Freshly harvested garlic bulbs contain allins, which on drying get transformed into allicin, cycloallin, vinyl dithins and allyldi- and tri-sulfides. They also contain polysacharrides.

Garlic is used for a variety of conditions, including arteriosclerosis, common cold, cough, bronchitis, fevers, colds, inflammation of the mouth and the pharynx and tendency to infection. Its antifungal, antimycotic and lipid-lowering effects have been proven. In folk medicine, garlic is used for digestive disorders (blotting and convulsive pain), menstrual pain, diabetes and externally for corns, warts, calluses, otitis, muscle spasm, neuralgia, arthritis and sciatica (DerMarderosian, Apr 1994). The common use of garlic in Ethiopia is for the relief of cough and cold.

While the consumption of large amounts of garlic can lead to stomach problems, appropriate amount of garlic intake is devoid of any health hazard. Frequent contact with garlic may lead to rare allergic reactions like hand eczema. Adverse reactions to fresh garlic use are dermal burns and anticoagulation. A person who is on anticoagulant therapy, like aspirin or warfarin, should avoid taking garlic, because of the additive effect of the latter (Smolinske, 2000).

The average daily dose of garlic is 4 gm of fresh garlic, or 8 mg of garlic oil. Garlic oil can be prepared by maceration with fatty oil (1:1), or by steam distillation. Alternatively, one fresh garlic clove may be taken one or two times daily. Garlic should be stored in a dry place (DerMarderosian, Apr 1994).

Aloes

Vernacular name: Eret

There are about 500 aloe species worldwide. The name is derived from the Arabic word “aloeh” which means “bitter and shiny substance”.These perennial succulents grow in Africa, in the Mediterranean area, the Caribbean, Japan and America. In Ethiopia, about 37 species are reported to occur (Dagne and Steglich, 1992), and recently an additional six species were identified by botanists at

Addis Ababa University. The fleshy leaves of aloes are stiff and spiny, and grow in a rosette. A bitter yellow sap exudes when the leaves are cut.

During the time of the Pharaohs in Egypt, aloe was referred to as the "Plant of Immortality". In the bible, John 19:39-40 mentions that Nicodemus brought a mixture of aloes and myrrh for the preparation of Christ's body for funeral. Alexander the Great is said to have gone to war for the sake of securing aloes. According to the Greek physician Dioscorides, in ancient times aloe was used for the treatment of wounds, to stop hair loss, treat genital ulcers and eliminate hemorrhoids (DerMarderosian, Apr 1992). Its use in Ethiopia to treat wounds and stop hair loss corresponds with similar uses in other cultures in the past.

Aloe yields two commercial products, aloe latex and aloe gel. Aloe latex is obtained by draining the bitter yellow latex from the outer portion (beneath the epidermis) of aloe leaves, and drying it to a reddish-black glistening mass (Tyler, 1994). It contains the anthraquinone barbaloin, other related glycosides known as aloinosides, chrysophanic acid and resins. Removal of the resins by filtration gives a residue rich in barbaloin. On the other hand, aloe gel is a clear gelatinous material, obtained from the inside portion of the leaves. Chemically, it is devoid of anthaquinone glycosides; it contains a polysacharride glucomannan, which contributes to the emollient effect of the gel when applied topically. Aloe gel is a product that is widely encountered in the cosmetic and health food industries. Other constituents of aloe leaves include tannins, organic acids, enzymes, vitamins and steroids. Aloe also contains bradykininase, which relieves pain and decreases swelling and redness. Its magnesium silicate content is believed to contribute to the antipruritic effect of aloe by blocking histamine (DerMarderosian, Apr 1992).

Aloe latex is a drastic cathartic, due to its aloinosides content, and has a strong purgative effect on the large intestine. It has also shown some antimicrobial activity against certain pathogens. Aloe gel is often used in the treatment of minor burns and skin irritation. The activity in treating burns may stem from its moisturizing effect, which prevents air from drying the wound.

Aloe products are relatively benign. While internal use has been associated with severe abdominal cramping, preparations of aloe for external use are generally safe.

Brucea antidysenterica (Vernacular name: Waginos) and *Maytenus senegalensis* (Vernacular name: Kebkeb)

These important Ethiopian medicinal plants were two of the most promising plants that were studied extensively in the early years of the United States National Cancer Institute (NCI) search for cancer chemotherapeutic agents from plant sources. These two plants are used in Ethiopia as traditional medicines for cancer treatment (Hartwell, 1967; Wilson and Gebre Mariam, 1979). In addition, *B. antidysenterica* is used for other medical conditions as indicated in Table 1. From *B. antidysenterica* two potent antileukemic quassinoids, bruceantin and bruceantinol were isolated, while the ansa macrolide alkaloid maytansine was isolated from *M. senegalensis*, as well as from other *Maytenus* species (Kupchan *et al.*, 1970; 1972b).

In the early trials at NCI, bruceantin and maytansine exhibited potent anticancer activities in various murine tumors. However, in Phase II clinical trials, these compounds did not show sufficient activity to warrant further development (Suffness and Durro, 1982). Although the compounds isolated were not potent enough to be pursued further in the NCI program, the use of these plants in traditional medicine in Ethiopia for cancer treatment has been indirectly confirmed to have valid chemical and pharmacological basis.

Catha edulis

Common name: Chaat; Khat, Gat

The *chaat* plant is an evergreen shrub, or a tree about 9 to 12 feet high, and is distributed in Kenya, Yemen and Ethiopia. The fresh leaves and twigs are chewed by people in Ethiopia, North Yemen, Kenya and Madagascar to attain a state of euphoria and stimulation. Its use has also spread to Uganda, Tanzania, Congo, Zimbabwe, Zambia and South Africa. The scientific name of *chaat* (*Catha edulis*) indicates its edibility. It is called "*chaat*" in Amharic (Ethiopian official language), "Kat" or "Ga-a-t" in Arabic, "Mera" in Swahili and "Abyssinianti" or "African salad" in English (Anonymous, January 1, 1999). Its other names include Abyssinian tea, Catha, Kus-el-Salahin, Quat and Tohai. Because of its social acceptability, *chaat* chewing plays an important role in celebrations, meetings, marriages and other gatherings. It grows better at higher altitudes, and the tender twigs and leaves are harvested almost all year-round (DerMaderosian, Mar 1993). Freshly harvested *chaat* is wrapped in leaves of the banana plant, or packaged in plastic bags and marketed. It is customary to sprinkle the leaves with water, in order to retain the potency during transport. Unless it is frozen, *chaat* loses much of its potency within 24 to 48 hours after harvest (Geisshusler and Brenneisen, 1987). It appears that *chaat* market has extended to places far removed from the areas of cultivation. It has been found in France, Italy, Switzerland, Great Britain and the United States. It is estimated that 2 to 8 million portions of *chaat* are consumed daily worldwide. The amount of *chaat* chewed for a certain length of period in one day varies, but the usual average is about two ounces. Millions of Ethiopians chew *chaat*. Once limited to eastern parts of Ethiopia, mainly Harar, *chaat* is now cultivated for commercial purposes throughout the country (Kassay *et al.*, 1999). *Chaat* is also a component of several Ethiopian traditional poly-prescriptions, which are used in the treatment of mental disorder, otitis media, stomach problems and venereal diseases (Abebe and Ayehu, 1993). Historically, *chaat* has been used for the treatment of fatigue, depression, obesity and gastric ulcers (Al-Meshal,1988). The Arabic name "Ga-a-t" (400 + 100 +1) denotes the numeral 501, which signifies 501 medicinal uses of the plant (Getahun, 1976). A 1995 Ethiopian study revealed that *chaat* consumption, traditionally confined to certain segments of the population, had become popular among all segments, with adolescents and adults being the more common consumers (Selassie and Gebre, 1996).

The major constituents of *chaat* are katin (cathine), which is (+)-norpseudoephedrine {S(-)-α-aminopropiophenone} and cathinone (alpha-aminopropiopheneone). Cathine is amphetamine-like stimulant whose concentration in dried *chaat* leaves ranges from 0.1% to 0.2%. It has about one-tenth the stimulant potency of amphetamine. Cathinone, which is more potent than cathine in its stimulant effect occurs in variable quantities in the fresh leaves. A powerful stimulant, cathinone has been classified as a Schedule I controlled substance by the United Nations Convention on Psychotropic Substances, upon recommendation of the World Health Organization, while cathine has been classified as a schedule III substance (Elme and Samatar, 1987). Cathinone has a high potential for abuse, and does not have any accepted medical use. Thus, it can be used only for scientific investigation. On the other hand, cathine has a much less potential for abuse, and in certain countries it is used as an ingredient of pharmaceutical preparations to induce anorexia (Eisenberg *et al*,, 1987). Although the sale and use of *chaat* are known in big US cities, it is still not considered as a "street drug", like heroin, cocaine, crack, or marijuana. Other constituents of *chaat* include khatamines and tannins. About 30 more minor compounds have been isolated from *chaat* leaves. The 'red' type of *chaat* contains more cathinone than the white type, and there is more cathinone in fresh leaves than in the dried leaves. Hence, the most potent type is the fresh red type *chaat*. In the Harar region, Ethiopia where *chaat* is chewed to a much greater extent, about eight varieties of *chaat* are known (DerMaderosian, Mar 1993).

The stimulant effect of *chaat* lies somewhere between caffeine and amphetamine. Central stimulation by *chaat* is manifested by euphoria, alertness, hyperactivity, excitement, aggressiveness, anxiety and manic behavior. Physical dependence does not occur, although mental depression, sedation and social separation can be seen. Hypertension, increased respiratory rate, hyperthermia, sweating, palpitations, stomatitis, oesophagitis and gastritis noted in chronic *chaat* users are most likely due to the presence of astringent tannins, which also have constipation effect. There is interesting data which indicated that, when a ban was in effect on *chaat* in Aden, Yemen in 1957, the sales of laxatives went down by 90%, only to return to normal levels when the ban was lifted. Anorexia, a result of loss of appetite, is common in *chaat* addicts.

Severe side effects of *chaat* use include cerebral hemorrhage, myocardial infarction and pulmonary edema. In males, libido increase may be noted initially, followed by a loss of sexual drive. In females, the opposite effect is observed; improvement of sexual performance has been reported. Oral cancers have also been associated with chronic *chaat* chewing.

The social and economic significance of *chaat* chewing in Ethiopia is far-reaching. It is a major foreign exchange earner for the country, in some years being next only to coffee, hides and skins. For example, a statement from the Dire Dawa Foreign Trade branch office indicated that recent export sale of *chaat* earned much more foreign exchange than coffee, fruits and vegetables combined. *Chaat* growing farmers in certain regions claim the economic benefit of *chaat* exceeds that of food-grains, and thus prefer engaging in the former. However, while the economic importance of this commodity cannot be over-emphasized, excessive *chaat* use may result in serious health and social problems. Some *chaat* addicts are lax in their job and other responsibilities. The sexual failure in chronic *chaat* chewers may have deleterious effect on marriages, thus adversely affecting the stability of the family.

Commiphora abyssinica

Common name: myrrh

Vernacular name: kerbe

C. abyssinica is a tree that grows to a height of 30 feet. It is native to Africa in the Red Sea region (Ethiopia, Somalia and the Arabian Peninsula). A pale yellowish-white exudate is obtained from the bark as a result of natural cracks, or from fissures cut manually to obtain the resin. The exudate hardens into yellowish-brown tears, which yield myrrh resin. Myrrh is neither the plant, nor plant part; it refers to the oleo-resin derived from incisions in the bark of the plant.

Myrrh contains a complex mixture of 2.5% to 10% volatile oil, 50% to 60% of gum, and 25% to 50% of resin (Tyler, 1994).The therapeutic attributes of myrrh may be due to the sesquiterpenes in the volatile oil component and the resin acid in the resin portion. Myrrh has been useful for centuries, and used as antiseptic, emenagogue and antispasmodic. It has also been used to treat leprosy and syphilis, as well as in religious ceremonies of ancient Egyptians (DerMarderosian, Feb 1994). In Ethiopia, it is used as a fragrance in Coptic church ceremonies. Today, myrrh is used to impart flavor to foods. It has also been reported to possess mild astringent properties and antimicrobial activity in vitro. Its reported antimicrobial properties provide support for its use as an antiseptic in Ethiopian traditional medicine. Myrrh is generally considered as non-irritant, non-sensitizing and non-phototoxic to human and animal skin, although several dermatitis cases have been reported with its use (DerMarderosian, Feb 1994).

Coriandrum sativum
Common name: Coriander
Vernacular name: Dimbelal

C. sativum is a plant that is 20 to 70 cm high. The stem is erect, glabrous and branched on top. The fresh herb and unripe fruits have a bug-like smell, while the ripe fruit has a pleasant and tangy smell and taste. In Ethiopia, the leaves and seeds are used to impart flavor to foodstuffs and as medicinal agents. As is the case elsewhere in traditional medicine, the leaves are used to treat colic and stomach ache. It is also found in the Mediterranean region, central and eastern Europe, eastern Asia. and North and South America.

The herb contains volatile oil components, of which trans-tridec-2-enole is the constituent responsible for the smell. Other components include fatty acids and coumarins.

In Ethiopia, in addition to other applications, it is also used for colic and stomach ache. The essential oil of coriander stimulates gastric secretion, is carminative and spasmolytic. Coriander is indicated for dyspeptic complaints, upper gastrointestinal problems, and for loss of appetite. In folk medicine, it is used for indigestion and gastric complaints, cough, chest pain, bladder complaints, leprosy rash, dysentery, headache, oral and pharyngeal diseases, halitosis and post-partum complications. Most of the folk medicinal uses have not been proven scientifically. No health risks and serious adverse events have been reported with the appropriate use of coriander, except for a weak potential for sensitization.

The average daily dose is 3 gm, one cupful of infusion between meals, or 10-20 drops of the tincture after meals. The infusion is prepared by pouring 150 ml of boiling water over 2 teaspoonfuls of crushed coriander fruit, followed by straining. The tincture is made by percolating one part by weight of coriander with two parts by weight of 45% ethanol (Gruenwald *et al.*,1998).

Cucurbita pepo
Common name: pumpkin; pepo
Vernacular name: Duba ferre

The vine-like stems of *C. pepo* produce large edible fruits. The seeds have been used in traditional medicine for centuries to immobilize and aid in the expulsion of intestinal worms and parasites. The anthelminthic component of *C. pepo* seeds appears to be a carboxypyrrolidine compound known as cucurbitin, which occurs at a concentration of 0.18% to 0.66%. The seeds also contain a large amount of fatty acids (about 25% oleic acid and 55% linoleic acid) (DerMarderosian, May 1990).

Cucurbita seeds are effective taeniafuge, but the amount of the active component cucurbitin varies with the strain, so the effective amount is difficult to know, since it could range anywhere between 60 and 500 gm of the seeds (Tyler, 1987). The usual forms of administration are as ground seeds by themselves, as a tea infusion, or as an emulsion by beating the seeds with powdered sugar and milk or water. In Ethiopia, the toasted pumpkin seeds are chewed as a mild taenicide. They are also occasionally eaten as food in sauce (*wot*).

Cucurbitin has been shown to inhibit the growth of *Schistosoma japonicum* in vivo. Despite concentration variations, the aqueous extract of Cucurbita seeds have demonstrated anthelminthic effect. The fatty acid components may be of some benefit in the management of prostatic disorders, but good evidence is lacking. The oil may have a mild diuretic effect. In general, this plant medicine is non-toxic and safe to use.

Cymopogom citratus

Common name: lemon grass

Vernacular name: Tej sar

C. citratus is a perennial grass that is cultivated in the West Indies, Central America and tropical regions. A number of medicinal uses have been attributed to this plant in South American folk medicine. It is used as an antispasmodic, analgesic, for the management of nervous and gastrointestinal disorders, to treat fevers and as an anti-emetic. The Indians use it as anti-tussive, anti-rheumatic and antiseptic. *C. citratus* is usually taken by ingesting an infusion made by pouring boiling water on fresh or dried leaves. This closely resembles the mode of use in Ethiopia. Its use in Ethiopia for stomach ache agrees with its utility for gastrointestinal disorders in other cultures.

Fresh *C. citratus* grass contains 0.4% volatile oil, 65-85% of which contains citral (a mixture of geraniol and neral). Citral is the chemical that imparts flavor to lemon oil, perfumes and cologne. Other constituents in the oil include myrcene (about 70%), geraniol, diterpenes, alcohols, aldehydes and more than a dozen other fragrant constituents (DerMarderosian, Oct 1989). Note that the use of tej sar in Ethiopia to impart flavor and fragrance to *kotcho* (a false banana staple diet of certain southern Ethiopian communities) is due to its volatile oil components.

Pharmacological studies of *C. citratus* in animals and human beings have failed to show any gastrointestinal, antipyretic, or analgesic effects, despite the fact that it has been used for these purposes in different cultures. In general, these studies and others have demonstrated total lack of any pharmacologic effect when used orally. However, this plant has a low toxicity potential. Therefore, *C.*

citratus has been dubbed as one of the most popular placebos available (DerMaderosian, Oct 1989).

Datura stramonium
Common name: Jimson Weed
Vernacular name: Etse Faris

D. stramonium is an annual that grows to a height of about one to two meters high. The leaves are about 20 cm long. The foliage has an unpleasant smell, while the flowers are fragrant and poisonous. It probably originated in Central America, and is found in most subtropical parts of the world.

A wide variety of compounds have been isolated from *D. stramonium.* Tropane alkaloids (hyosciamine, scopolamine, apatropine, belladonnine, etc.), indole alkaloids, flavonoids, withanolides, lectins, fatty acids and proteins are constituents of this plant.

Various preparations of *D. stramonium* are used for asthma, spastic and convulsive cough, pertussis during bronchitis and influenza. It is also used for central nervous system diseases. High intake of this plant leads to excitation, compulsive speech, hallucination, delirium, manic episodes, exhaustion and sleep. Overdose symptoms include skin reddening, dryness of mouth, irregular heart rhythm and mydriasis. There is no standard dose recommended (Gruenwald *et al.*, 1998).

Eucalyptus globulus
Common name: Eucalyptus
Vernacular name: Bahr zaf

Eucalyptus is a deciduous tree that can grow to a height of about 40 m. The mature glossy green leaves are 10 to 13 cm long. Eucalyptus is indigenous to Australia and Tasmania, and is cultivated in subtropical regions of southern Europe, Africa, Asia and America. This plant was introduced into Ethiopia during the reign of Emperor Menelik II. It mainly grows in the highlands of Ethiopia, typically around Addis Ababa.

Eucalyptus contains a volatile oil called cineole (eucalyptol, cajepatol), which has expectorant properties (Windholz,1976a). Eucalyptus oil is obtained by steam distillation of the fresh leaves and branch tops. Other monoterpene constituents are p-cymene, alpha-pinenes, limonene, geraniol and camphor. The oil is used to make ointments and cough preparations like Vicks Vaporub and Hall's Mentholyptus (DerMarderosian, 1988b). Eucalyptol is a constituent of Listerine Antiseptic Mouthrinse, a common oral hygiene product used to impart fresh breath and fight dental plaque (Westley *et al.*,1999). In folk medicine, the multiple medicinal uses of Eucalyptus include asthma, cough, diseases of the frontal sinuses, fever, flu, gastric complaints, hoarseness, incipient scarlet fever and measles, worm infestation and as an intestinal antiseptic. In Ethiopia, the vapor from boiling leaves in water is inhaled to treat common cold symptoms.

In animal experiments, eucalyptus has been shown to exhibit cough-relieving effect. It has also been shown to be secretolytic, expectorant, weakly antispasmodic, deodorizing, cooling and diuretic.

For internal use the average daily dose is 0.3 to 0.6 gm of eucalyptus oil. For external use several drops, at a concentration of 5% to 10% with respect to the oil, may be rubbed into the skin. Use of eucalyptus has been associated with rare side effects of nausea, vomiting and diarrhea. Life-threatening over dosage symptoms include circulatory disorder, collapse and asphyxiation (Gruenwald *et al.*,1998).

Foeniculum vulgare

Vernacular name: Insilal

Common name: Common, sweet, or bitter fennel

Insilal is a traditional medicinal herb used in Ethiopia. This plant also grows in southern Europe and Asia minor. All plant parts are aromatic. Cultivated fennel stalks grow to a height of about three feet. The plant was known to the ancient Chinese, Indian, Egyptian and Greek civilizations. A Greek legend has it that man received knowledge from Mount Olympus as a fiery coal enclosed in a stalk of fennel. Fennel was also in great demand during the Middle Ages as an appetite suppressant. It has been claimed to be a useful antidote to poisonous herbs, mushrooms, snake bites, and for the treatment of gastroenteritis, indigestion, to stimulate lactation, and as an expectorant and emenagogue.

The plant contains volatile oil compounds (about 90% trans-anethole), several other volatile constituents and fixed oil. Fennel has been shown to contain compounds with estrogenic activity. It has been found to be effective for the treatment of indigestion, although this activity appears to be weak. The fruit of the plant has been used for this purpose by pouring 1 cup (240 ml) of boiling water over 1 teaspoonful (2.5 g) of crushed fruit, steeping for 10 to 15 minutes, after which it is strained and drunk (DerMarderosian, Aug 1994). In Ethiopia, the leaves are used for stomach ache and other medical problems. Fennel has also been official and included in the German Commission E monographs as a remedy for indigestion.

A serious concern about using fennel is its resemblance with poison hemlock, which contains the very toxic alkaloid conine, and thus could easily be mistaken for fennel. Other hazards associated with the use of fennel are allergic reactions, photodermatitis and contact dermatitis in sensitive individuals (DerMarderosian, Aug 1994).

Glinus lotoides

Vernacular name: metere

Metere is a plant that is widespread in Ethiopian lowlands. The seeds are used a mild taenicide, and are usually mixed with niger oil and other taenicides to enhance the efficacy (Kloos, 1976). Compounds isolated from *G. lotoides* include a triterpene glycoside (Abegaz and Tecle, 1980), and the triterpenoidal saponin glycosides glinusides A-E (Hamed *et al.*, 1996; Hamed and El-Emary, 1999). Because of its low toxicity, this plant has been the subject of much interest by Ethiopian scientists for possible development as a safe taenicide. Preliminary laboratory studies recently conducted by Addis Ababa University School of Pharmacy scientists have demonstrated *metere*, formulated in a capsule dosage form, to be a safe and effective taenicide. Although this is a significant finding, more studies are required to identify the active component (s) and establish the long range (chronic) toxicity based on the active isolate (s).

Hagenia abyssinica

Vernacular and common name: Kosso

H. abyssinica is a tree that grows to a height of about 20 meters. It has branched flowers with thickly-glandular panicles, and the male flowers are greenish, while the female flowers are dark-red in color. It is indigenous to northeast Africa, and is cultivated in Ethiopia. It has also been used in France and England as a taenifuge. The medicinal parts of this plant are the leaves, the unripe fruits and the dried panicles of the female flowers. A proverbial and an all-Ethiopian taenicide, this tree grows in Ethiopia at altitudes between 2,500 and 3,000 meters above sea level. The blood-red flowers of the *kosso* tree are the commonest Ethiopian traditional taenicide. *Kosso* is primarily a vermifuge, although it is considered to be a muscle poison in lower animals.

The compounds found in *kosso* include acylphloroglucinols, which are monomeric, dimeric, or trimeric kosotoxins (Gruenwald *et al.*,1998).Plants containing phloroglucinol derivatives have been used for centuries as anthelmintic remedies (Robinson, 1980). Tannins and volatile oils are the other constituents found in *kosso* (Windholz, 1976 b).

Kosso has been used to expel tapeworms, since as far back as the sixteenth century. It has been known as an extremely bitter and powerful purgative. The crushed flowers are soaked overnight in water, local beer (*tella*), or mead (*tej*) before the filtered solution is drunk in the morning. It is normally taken on empty stomach, and food abstention is continued until the huge segments of the worm are expelled in the feces. When *kosso* was administered in a paste form to human volunteers, the effective dose was determined to be in the range 10.3 to 14.7 gm, and the worm expulsion time to be in the range 9.9 to 10.7 hours (Desta, 1995). There is a superstition held that a person taking *kosso* should abstain from sex the previous night, so as the efficacy is not compromised. Normally, it starts evacuation of the intestines within a few hours. *Kosso* fails to eject the tapeworm completely. The head (scolex) of the tapeworm remains hooked to walls of the digestive tract, and it takes about two months for the worm to grow to its original size, after which time it starts shedding the mature segments (proglottids) at the most distal section of the worm, thus signaling treatment is due again. Because of re-infection after eating raw meat, and/or the inefficacy of the treatment, people take *kosso* once about every two months.

In Ethiopian highlands, parents are said to have used *kosso* as a means of disciplining their children. The punishment involved making the children inhale the smoke from a burning *kosso*, which made them sneeze and cough. Despite the medicinal importance of this drug, the profession of selling *kosso* was looked down upon traditionally. In this connection, there is an interesting Ethiopian legend around the end of the so-called Era of the Princes, during the latter half of the nineteenth century. The mother of Emperor Tewodros is said to have been a *kosso* vendor. Empress Mintewab sent out an expedition from Gondar, led by a famed warrior *Dejazmatch* to annihilate the growing forces of *Dejazmach* Kassa, who was later to become Emperor Tewodros. In the course of his preparation for the battle, the *Dejazmatch* would repeatedly refer to *Dej*. Kassa as "son of a *kosso* dealer" in a derogatory and degrading way. The contingent sent by the Empress was routed in the ensuing battle, and the *Dejazmatch,* who led the expedition was taken prisoner himself. He was presented to *Dej*. Kassa, who forced the former to feast on a generous serving of the bitter *kosso* by way of punishment. Later, after Tewodros' mother died, someone would compose the following sensational poem:

"Shih feres kehuwalaw shih feres kefitu,
yehin satay motetch kosso shatch enatu."

It roughly translates into:

> *A thousand horsemen escorting him from behind,*
> *a thousand horsemen escorting him from the front,*
> *his (Tewodros') kosso dealer mother did not live*
> *long enough to see his might.*

Kosso was a major article of trade in Ethiopia. It has always been a widely available and cheaply purchased commodity. *Kosso* use was so widespread in Ethiopia that the first modern pharmacy was referred to as "*kosso bet*" (*kosso* house). However, *kosso* use has also been associated with catastrophic results, with the prominent victims being the early nineteenth century noble Ras Nadew, his wife and Mardasa Jote, a ruler of Wollega, who all presumably died of *kosso* toxicity (Pankhurst, 1990). Frequent use of *kosso* was also believed to cause prolapsus ani (protrusion of the rectum). Johnston referred to *kosso* as a "vile drastic cathartic". The side effects include irritation of the gastrointestinal tract, salivation, exhaustion, nausea and extensive diarrhea.

The overdose symptoms are collapse, vision disorders and changes in cardiovascular, respiratory and central nervous systems. The supportive treatments include gastrointestinal emptying by inducing vomiting or gastric lavage, intravenous diazepam to treat spasm, intravenous atropine to treat colic, electrolyte replacement. Acidosis could be treated by infusing sodium bicarbonate. In case of shock, plasma expanders have been recommended (Gruenwald *et al.*, 1998).

Impatiens capenensis
Common name: Jewel Weed
Vernacular name: Telenj

Members of the genus *Impatiens* are tender, succulent herbs that are commonly grown as bedding and house plants. Jewel weed is sometimes referred to as "touch-me-not", owing to the presence of a seed capsule made of a soft fleshy tissue that tends to expel its contents if touched or shaken. It grows in temperate regions and in South Africa.

The chemical constituents of *Impatiens* species are little known. A compound 2-methoxy-naphthoquinone, which has antifungal property, has been isolated from a related species *I. balsamina*. Jewel weed is a popular herbal remedy for topical irritation, such as that produced by poison ivy, although this effect has not been proven unequivocally (DerMarderosian, Mar 1995). The effect is believed to be mediated by lawsone, a constituent of Jewel weed, which counteracts the action of the irritating agent urushiol in poison ivy (Duke, 1997; DerMarderosian, Mar 1995). A poultice made with the crushed leaves of Jewel weed has a reputation for alleviating other skin conditions, such as bruises, burns, ringworm, hemorrhoids, sores and warts. In addition to its other uses for other complaints, the use of *telenj* in Ethiopia for the treatment of poisoning (Table 1) is in agreement with similar use of the plant for the treatment of poison ivy symptoms. No major health hazards have been associated with the use of this plant.

Lepidium sativum

Common name: Garden cress

Vernacular name: Feto

Garden cress is 20 to 40 cm high with an erect, round and branched stem. The leaves are light green and thin. The seeds have a slimy skin and swell in water. The fresh herb has a spicy odor.

The chemical constituents of *L. sativum* include glucosinolates which, on cutting the plant, get converted to benzyl cyanide, ascorbic acid, cucurbitacins and cardenolides.

This herb is used for cough and vitamin C deficiency. In traditional medicine it is used for constipation, as a diuretic and to boost immunity. Its diuretic action has not been confirmed scientifically. The anti-bacterial and anti-viral effects *L. sativum* against certain microorganisms have been determined. High doses of fresh *L. sativum* can cause gastrointestinal irritation (Gruenwald *et al*, 1998).

Myrtus communis

Common name: Myrtle

Vernacular name: Addes

Myrtle is an evergreen bushy shrub, or a small tree of about five meters high, with dark green leaves. In Ethiopia it is widely cultivated in household gardens, and used as a traditional cosmetic for women, in addition to its use for the treatment of dysentery. It grows in the Mediterranean region and northwestern Himalayas. The flowers have a sweet spicy taste.

M. communis contains volatile oils and acylphloroglucinols. Among the major volatile oil constituents are myrtenol and myrtol. Myrtol is the active constituent.

Myrtol is absorbed in the intestine, and stimulates the mucous membranes of the stomach. It is fungicidal, disinfectant and antibacterial. It is used for respiratory tract infections, such as bronchitis, whooping cough, tuberculosis of the lung, bladder conditions, diarrhea and worm infestation. Its use is contraindicated in inflammatory conditions of the gastrointestinal tract and in severe liver diseases.

Rare side effects with the use of myrtle oil are nausea, vomiting and diarrhea. Symptoms of overdosage, due to high cineole intake, include life-threatening fall in blood pressure, circulatory disorder, collapse and respiratory failure (Gruenwald *et al.*, 1998).

Phytolacca dodecandra

Common name: Soap berry plant

Vernacular name: Endod

Endod, also called the soap berry plant, is native to Ethiopia. It is also found in eastern, western, central and southern Africa. The small berries, when dried, powdered and placed in water, yield a foaming detergent solution, hence their use in Ethiopia to wash clothes.

The name '*endod*' has always been linked to the late renowned Ethiopian scientist Aklilu Lemma, who in 1965, while studying the distribution and ecology of schistosomiasis in the town of Adwa in northern Ethiopia, observed for the first time the molluscicidal properties of *endod.* He noticed that in places along rivers and streams where people washed clothes with powdered *endod* berries, there were more dead snails downstream than there were in adjacent areas. Subsequently, it was shown that a preparation of *Phytolacca dodecandra* berries, widely used in Ethiopia for laundering clothes, possessed molluscicidal properties (Lemma, 1965; 1970). In 1989, for his ground-breaking work on *endod*, Dr. Aklilu Lemma, along with his colleague Dr. Legesse Wolde-Yohannes, was awarded the prestigious Right Livelihood Award. In 1990, the University of Toledo in the United States awarded him an honorary Doctorate degree, in recognition of his outstanding research work on *endod.* Since the pioneering work of Aklilu Lemma, *endod* had generated considerable interest for its potential use in the control of schistosomiasis (Anonymous, April 24, 1997).

According to a field trial conducted in a town in the northern part of Ethiopia by Goll and co-workers in 1983, when dried and powdered *endod* was applied as a slurry to provide a concentration of 80 mg/liter for six hours and treatment was repeated after three weeks, the prevalence of schistosomiasis decreased from 61.5% to 36.4% over a period of five years (Hostettmann, 1989). Of all other plants tested, *endod* was the most studied and certainly the most promising molluscicidal plant, by virtue of its high potency and minimal co-lateral toxicity. *Endod* kills the schistosomiasis-transmitting snail at a concentration as low as 20 mg/liter, a potency which perseveres over a wide range of pH values, temperatures, as well as under ultra-violet irradiation in various concentrations of the river-bed mud.

Chemically, *endod* berries contain up to 25% saponins, which include three molluscicidal saponins called oleanonglycotoxin-A, lemmatoxin and lemmatoxin-C, all of which are active at the 1.5 to 3.0 mg/liter (ppm) range (IC_{90}/24 hours). These compounds are water-soluble, making *endod* suitable for field application. While designing an improved extraction method for *endod*, Hostettmann and co-workers in Sweden, isolated six additional saponins which were devoid of molluscicidal activity (Hostettmann, 1989). However, these bidesmosidic saponins (having two sugar portions linked to different sites of the compound) upon hydrolysis furnished a series of monodesmosides, which were active. Thus when *endod* powder is stirred in water it gives additional artefact saponins which are molluscicidal. The molluscicidal saponins have also been shown to be spermicidal, with a potency comparable to that of the commercial spermicide Nonoxynol-9.

At mollucicidal concentrations, *endod* has very low toxicity towards mammals, birds and other plants. However, it is toxic to fish, as are all other commercial molluscicidal products. Furthermore, *endod* and its extracts have been shown to be non-mutagenic (non-carcinogenic), indicating that *endod* is safe. Despite the fact that a large number of plant molluscicides had been documented, very few actually satisfied the criteria for large-scale application (Mott, 1987). Many simply do not have sufficient activity to warrant any application. In addition, extracts of plants for wide application in infected sites should originate from regenerating parts, such as fruits and leaves, so that the plant itself is not felled and destroyed. For example, roots are not appropriate plant parts as this will require uprooting the whole plant. *Endod* seemed to satisfy all the criteria. Standardization of extracts and long-term toxicity remain important issues.

Plant molluscicides do not provide a universal solution for the control of schistosomiasis. Only an integrated program coupled with improved standards of hygiene, chemotherapy and mollusciciding will help reduce the transmission of the disease. However, mollusciciding focal areas of transmission, especially with locally available plant products like *endod*, is quite significant in the control of the disease.

Punica granatum

Common name: Pomegranate

Vernacular name: Roman

P. granatum is a shrub of about 1.5 meters high, or a small tree 3 to 5 meters tall. It probably originated in Asia. It is widespread in the Mediterranean region, the Near East, South Africa, southern Asia, China, Arabia, the United States and South America.

The fruit peel contains tannins, while the rinds of the stem and the rhizome contain tannins and piperidine alkaloids. Experiments have confirmed that a solution prepared from the bark has activity against pig and poultry tapeworms, and this effect is ascribable to the piperidine content of *P. granatum*. The indications for the use of pomegranate include for the treatment of tapeworm infestation and other intestinal worms, diarrhea and dysentery. The tannin content may be responsible for the anti-diarrheal effect, due to its astringent properties (Duke, 1997). It is also used as a gargling rinse for soar throat, as an abortive, and externally to treat hemorrhoids. The principal uses of *P. granatum* in Ethiopia are for the treatment of cough, diarrhea and tapeworm infestation (Table 1). As a taenicide, *P. granatum* was believed to be superior to other traditional taenicides, in that it was thought to eject the whole parasite. For this purpose, about 35 gm of the roots is boiled in a liter of water, and the resulting solution drunk. However, since the roots were scarce, the bark, the branches and the pith of the fruits were used instead, to prepare the taenicide (Pankhurst, 1990).

The main side effect is gastric irritation due to tannins. Overdose symptoms are vomiting, dizziness, chills, vision disorders and respiratory failure. For tapeworm infestation, the usual dose is 20 gram of the bark juice in one single dose (Gruenwald *et al.*, 1998).

Ricinus communis

Common name: Castor seed oil

Vernacular name: Gullo zeit

R. communis is a perennial herb which reaches to a height of six to nine meters. The stems and branches may be flushed red or maroon. The leaves are large (up to one meter across), with long, green or reddish leaf stalks. The seeds are enclosed in an oval pod (Morton, 1977). It is cultivated throughout the world in temperate and tropical climates. The flowers of this plant eventually turn into seedbearing pods, which upon drying explode and eject the oval seeds (beans). Castor oil is extracted from the beans (Peirce, 1999).

Castor oil contains 45% to 50% oil, which is a mixture of triglycerides. Ricinoleic acid is the major component (75% to 90%). It is the cathartic principle which exerts its effect in the gut. The cake left after the expression of the oil is the castor pomace. Ricin, a component of castor oil is highly toxic (DerMarderosian, November 1992). It is a protoplasmic poison, so potent that it took Soviet agents a tiny fraction of a nanogram quantity fixed onto the tip of an umbrella to kill a Bulgarian defector at a London bus stop in 1978. It is so toxic that the US FBI has ranked it as the third most toxic substance known (Peirce, 1999). It has, in fact, been used as a chemical warfare agent (Windholz, 1976 c). Although ricin is known to occur in all parts of the castor plant, commercially processed castor oil is devoid of this substance. The commercial products are steam-treated to denature the toxins.

In modern medicine, castor oil is used in gut prep work for x-ray and surgical procedures of the bowel. It is also a proven laxative, described more aptly as a cathartic or drastic purgative to indicate its potency. The common laxative dosage of castor oil is 10 to 16 ml. Castor oil is also used in lubricants, lipsticks and other cosmetics, and a variety of other commercial preparations (DerMarderosian, November 1992; Peirce, 1999).

In Ethiopia, *gullo* (castor oil) plant is grown as a perennial crop. It is used as a mild purgative and in tannery work (Getahun, 1976). The roots have been used as a taenicide and bactericidal agent (Desta, 1995). The laxative use of castor oil is in concurrence with similar use in folkloric and modern medicine in other countries.

Ruta graveolens

Common name: Rue

Vernacular name: Tena adam

R. graveolens is a sturdy shrub 30 to 80 cm high with a woody root and a crooked, branched rhizome. The leaves are 4 to 11 cm long and 3 to 7 cm wide. The stems are erect, rigid, round, lightly branched and woody from below. This plant is found in the Balkans, southern Alps, southern France and Spain.

A number of compounds were isolated from *R. graveolens*, including alkaloids of the furoquinolone, acridine, quinazoline and quinoline types, volatile oil compounds, flavonoids, hydroxycoumarins, furocoumarins, pyranocoumarins and lignans.

Preparations of the rue herb, consisting of the dried above-ground parts and the leaves are used for menstrual disorders, as a uterine remedy, and as an abortive agent. In traditional medicine, it is used as a contraceptive and as an abortive agent. It is also used for inflammation of the skin, oral and pharyngeal cavities, earache, toothache, for fever, cramps, hepatitis, dyspepsia, diarrhea and intestinal worm infestations. In Ethiopia, it finds use in the treatment of headache, stomach ache, etc.

The side effects may include photosensitization, due to the furocoumarin and furoquinolone contents, photodermatoses on skin contact with the fresh leaves and sensitization. Overdose symptoms are vomiting, epigastric pain, liver and kidney damage, vertigo, delirium, fainting, tremor and spasm.

The usual dose is 0.5-1.0 gm, prepared as a tea, or cold decoction by adding one teaspoonful (2.8 gm) to one-fourth liter of water. For topical use, the leaves are applied to the teeth for toothache, and the juice from the leaves is used as ear drops for earache (Gruenwald *et al.*, 1998).

Taverniera abyssinica

Vernacular name: Dingetegna

T. abyssinica is an endemic plant species which grows in certain parts of Shewa province. The Amharic word "*dingetegna*" implies 'medicine for sudden illnesses'. The bundled interwoven roots of this plant are sold in about 15 g quantities on the streets and bus stops in Addis Ababa, as well as other towns of Ethiopia. The roots are chewed and the juice swallowed for the relief of stomach pain and fever (Dagne *et al.*, 1991).

Scientific studies have been conducted to determine the pharmacologic activities and chemical constituents of the roots of *T. abyssinica*. An aqueous extract of the roots has been shown to block the action of histamine and acetylcholine in the guinea-pig ileum (Noamesi *et al.*, 1990). Further, this extract relaxed the smooth muscles of the rabbit duodenum, abolished the pendular contraction and antagonized the effects of acetylcholine and histamine on the tissue. In another experiment, the aqueous extract of the roots was determined to have significant anti-ulcer effects (Dagne *et al.*, 1991). Thus, stomach ulcer induced in rats with ethanol/hydrochloric administration, showed marked healing after treatment with an aqueous extract of the roots of *dingetegna* when compared to control untreated group. These studies provide scientific explanation for the ethnomedical use of *dingetegna* to treat pain, when it originates from ulcers, or abdominal spasm. In fact, commercial anti-peptic ulcer medications collectively known as H_2-blockers like Pepcid®, Zantac®, Tagamet® and Axid® work through a comparable mechanism as *dingetegna*. The intestinal spasmolytic effect of this plant has been attributed to the active consituents medicarpin, 4-hydroxymedicarpin and 3.4-dimethoxypropiophenone, which are found in the roots.

In addition, the methanol and acetone extracts of *T. abyssinica* have been shown to possess significant nematicidal activity when tested in a standard micro-well plate assay, using *Caenorhabditis elegans* as a test organism (Dagne *et al.*, 1991). This activity is due to the constituents medicarpin and 4-hydroxymedicarpin.

T. abyssinica seems to be a promising plant to develop. No toxicity data have been reported thus far. However, considering the widespread and long-time ethnomedical use of the roots of this plant in Ethiopia, it may be generally regarded as safe.

Verbena officinalis
Common name: Vervain
Vernacular name: Attutch

Vervain is an annual, or biennial to perennial plant with branched, whitish root, erect rig, quadrangular stem with opposite and dull green leaves. It is cultivated worldwide. Several chemical constituents, including iridoids, flavonoids and caffeic acid derivatives have been identified.

Preparations of *V. officinalis* are used for soar throats, respiratory tract ailments, such as coughs, asthma and whooping cough. Internal multiple traditional uses include pain, cramps, fatigue, nervous disorders, liver and gall bladder diseases, hepatitis, kidney and urinary tract complaints, irregular menstruations, to provide lactation, for rheumatic diseases, gout, metabolic disorders, chlorosis and dropsy. Externally, it is used as a gargle for cold and other symptoms. It is also used as anti-pruritc treatment of skin diseases, minor topical burns, arthritis, rheumatism, dislocations and contusions. Many of the reported uses of *attutch* in Ethiopian traditional medicine (liver disease, soar throat, eczema, etc.) are in consonance with similar uses in other cultures as indicated above.

The daily dose is 2 to 4 ml of liquid extract prepared by extraction (1:1) of the plant material with 25% ethanol. In traditional use, the dose is 2 to 4 gm up to 3 times daily (4.5 to 9 gm is the usual range) of the infusion, prepared by adding 5 to 20 gm of the plant material to one liter of water (Gruenwald *et al.*,1998)

Withania somnifera
Common name: Withania
Vernacular name: Gizawa

Withania is related to the tomato and potato plants, and is a shrub that grows to about 1.5 meters. It is found in India, Afghanistan and Israel. The plant has been used widely in traditional systems, including the Indian system. The berries have been used as anti-emetic, while the fruits and roots have been used as sedative, diuretic and anti-inflammatory, as well as for chronic liver complications. In Ethiopia, the plant is used, among others, for the treatment of malaria (Table 1). The antimalarial activity of the leaf extract of Withania has been demonstrated scientifically (Bogale and Petros,1996).

A number of compounds have been isolated from Withania, such as an essential oil, a crystalline alcohol, some withanolides (steroidal lactones), beta-sitosterol and several glycosides.

Withania extracts have been shown to possess anti-inflammatory activity in rats, with acute inflammation induced by formalin. Alcoholic extracts of *W. somnifera* leaves have demonstrated anti-inflammatory activity at a dose of 1 g/kg, an activity equivalent to hydrocortisone at 10mg/kg and phenylbutazone 50 mg/kg. This study lends support to the folkloric use of the leaves of *gizawa* in Ethiopia for the treatment of arthritis. The steroidal lactone contistuents of Withania may contribute to its anti-inflammatory effects (DerMarderosian, July 1988).

Zingiber officinalis

Common name: Ginger

Vernacular name: Zingibil

Ginger is a creeping perennial plant with thick tuberous rhizome, which spreads underground. It has a characteristic aromatic and pungent taste and odor. It is indigenous to southern Asia, and is cultivated in the United States, India, China, West Indies and tropical regions. Ginger contains various volatile components, aryl alkanes (pungent compounds), gingerols, shogaols, gingerdiols and diaryl heptanoids (DerMarderosian, Nov 1991).

Ginger is used to remedy loss of appetite, for dyspepsia, prevention of motion sickness, as a carminative, expectorant and astringent. It is also used for abdominal cramping (Gruenwald *et. al.*, 1998). Since ginger is a cholagogue, it should not be taken in gall stone conditions. It is also contraindicated in morning sickness. The total daily dose is 2 gm of the freshly powdered drug taken with liquid. Its principal use in Ethiopia is for stomach ache, which is in accord with similar use in other cultures. Its anti-nauseant effect, which leads to anti-emesis is thought to arise from its direct effect on the intestinal tract (Tyler, 1995).

♣♣♣ Chapter 4 ♣♣♣

THE AFRICAN PERSPECTIVE OF MEDICINAL PLANT RESEARCH

In order to advance medicinal plant research in Ethiopia, exchange of information and collaboration with other African countries is critical. Since research resources (funding, manpower, equipment, etc.) are limited in Africa, scientists could benefit much from such collaboration. This can take the form of, for example, sharing bioassay facilities and powerful spectroscopic equipment (High Field Nuclear Magnetic Resonance Spectrometers) to evaluate natural products with reasonable turn-around time.

The idea of establishing a sub-regional network of natural products research was conceived by African chemists, who happened to cross paths at the 14th International Union of Pure and Applied Chemistry (IUPAC) Symposium in the Chemistry of Natural Products held in Poznan, Poland in 1984. These African chemists were from Ethiopia, Kenya, Sudan and Zimbabwe. Thus, they established the Natural Products Research Network for Eastern and Central Africa

(NAPRECA). This sub-regional network has grown to include Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania, Uganda and Zimbabwe as members. One of the leading Ethiopian chemists, Professor Ermias Dagne was elected as the first Executive Secretary of NAPRECA, with its head office in Addis Ababa, Ethiopia. He served in this capacity and as editor of the NAPRECA newsletter until 1996, when the head office was transferred to Dar es Salaam, Tanzania, with Professor M.H.H. Nkunya as the Executive Secretary. NAPRECA is devoted to the study, promotion and development of the chemistry, botany, biological activity and economic usage of natural products. It also publishes a regular newsletter, monographs, abstracts and symposia proceedings. In addition, it organizes and facilitates exchange of researchers, and administers a postgraduate scholarship program. At the biennial symposium, scientists present research lectures and posters covering wide-ranging aspects of natural products from African plants. Thus far, nine such successful symposia have been held in various cities of member countries. The first three were held at various venues in Addis Ababa, Ethiopia, Nairobi, Kenya and Arusha, Tanzania, respectively between 1988 and 1989. Since1991, they have been held biennially.

Although research reports presented at the biennial symposia are based mainly on work conducted on African plants, more emphasis needs to be placed on the study of traditional plants that are more likely to yield medicinally exploitable biologically active lead secondary metabolites.

It is important to note, however, that African countries, which in the past set out to validate herbal remedies scientifically and clinically did not achieve the desired results from practical public health point of view, due to lack of effective strategy. Countries like Ghana and Tanzania, after several years of such an approach, did not come up with any kind of recommendation or endorsement of herbal remedies to be used locally (Le Grand and Wondergem, 1989; Green *et al.*, 1994). As in Western countries, rigorous scientific validation of traditional herbs is not an easy task to undertake, especially if the same measures that apply to modern medicinal agents (pharmaceuticals) were to be employed. This kind of validation requires a lot of expertise, time and money, which are usually very prohibitive in Africa. There are also no guidelines in African countries to direct such endeavors to meet public health needs at the lowest village level. Understandably, African scientists are forced to be inclined to the scientific importance (publishability) of their investigation, rather than their public health importance.

Several issues have been raised in regards to research objectives on medicinal plants in Africa, which perhaps have also universal applicability (Le Grand and Wondergem, 1989; Abdool Karim *et al.*, 1994). These issues are relevant to the Ethiopian situation. They center around the following objectives:

- to exclude medicinally non-useful plants,
- to avoid toxic herbs,
- to establish reasonable safety and efficacy of herbs,
- to focus on those herbs that are used for common illnesses that are usually self-treated,
- to contribute towards national self-sufficiency by promoting useful herbs,
- to educate the public about the correct use of herbs through the print, radio and television media and
- to advance concerted effort by researchers and traditional medical practitioners to promote the safe use of herbs.

In fact, the afore-mentioned objectives cannot be met by any single entity alone. It requires the collaboration of the scientist, the traditional healer and other modern health personnel, who have easy access to the public consumers of botanical remedies. The role of the scientist is to provide the best information, derived form the literature and complemented with results of indigenous research.

THE FUTURE OF HERBAL MEDICINE RESEARCH IN ETHIOPIA

It is imperative that herbal medicine research be a coordinated effort. The Drug Research Department, Ethiopian Health and

Nutrition Research Institute appears to be at the forefront of herbal medicine research. In addition to the documentation of empirical knowledge used in traditional medicine, the Department has stored in electronic data file over 600 Ethiopian medicinal plants. For a good portion of these medicinal plants, literature reviews on chemical constituents and biological activities have been conducted. In 1996, the Department organized a trail-blazing workshop, in Nazareth, Ethiopia thus bringing together Ethiopian scientists in the fields of botany, chemistry, pharmacy, medicine and other related areas to examine the status of herbal medicine and map out feasible research strategies. Thus, in view of the scarcity of adequate laboratory facilities, shortage of scientific manpower, financial limitations, the relatively long time required to develop pure isolates and the chronic shortage of pharmaceuticals, the workshop recommended that pharmacognostic, chemical, pharmacological and clinical studies of candidate medicinal plants be integrated and coordinated in order to be able to develop final herbal products for public consumption (Abebe, 1996b). Furthermore, the workshop recommended that the selection of candidate medicinal plants for research be based on the considerations that:

> "...... A particular medicinal species is:
>
> - a common home remedy often cultivated in the backyard,
> - used both as source of food and medicine,
> - widely used for similar and identical purposes by different communities, or in use in folkloric remedies of other countries,
> - supported by scientific literature for the intended pre-clinical and clinical studies,
> - used against one of the priority health problems of the country. Or is it employed for health problems for which easy pharmacological model can be set up during testing biological activity? Or is it a plant employed for diseases whose diagnosis can be made based on symptoms,
> - not characterized by features that render the preparation and analysis of its constituents extremely difficult and time

consuming,

- used as sole prescription and not as a component of poly-prescription or part of a prescription recommended for alternative application with other remedies,
- prescribed on its own sole merit and does not require any additional pre- and post-adjuvant therapeutic procedures of other spiritual or material nature that can influence convalescence,
- believed to represent real national, scientific and economic need which justify its pre-clinical and clinical investigation."

Although a modest beginning has been made by the Drug Research Department of the Ethiopian Health and Research Institute in advancing and developing herbal remedies, much remains to be done in the areas of establishing standards, even for those herbs with traditionally proven therapeutic benefits. Standardization of herbs for all practical purposes is a rather complex process. First of all, it presupposes an herbal remedy in question originates from the same plant source (at the species and sub-species level), same collection time, location, growing conditions and uniform preparation methods. Initially, the activity must be established by well-designed, randomized, double-blind, placebo-controlled studies, involving a significant number of human subjects. Once the activity is determined by such trials, it is important to standardize this activity to ensure uniformity of same in each herbal preparation or dosage unit (Tyler, 1999). Perhaps this is a difficult task to undertake, in view of the fact that the observed activity may be due to one, or a combination of several components of the preparation. Other inactive constituents may also influence the activity of the product.

One method that has been proposed to standardize a product is by using an active marker compound, for which qualitative and quantitative analytical methods like high-performance liquid chrmatography (HPLC) and gas chromatography-mass spectrometry (GC-MS) techniques could be developed. These techniques assume that all important components of the herb co-occur in the same ratio, as in the initial product for which clinical studies have already been established. If the active ingredient (s) is (are) not clearly established, then the preparation (dosage unit) may be standardized using a known major compound, for which an assay procedure could be developed. This will indirectly ensure uniformity of the activity. The whole process of clinical studies followed by chemical profiling has been referred to as "phytoequivalence' studies. Thus, if two products are phytoequivalent, they are most likely to be pharmacologically and therapeutically equivalent, again assuming the same plant source and similar methods of preparation are employed in formulating the product.

Tyler (1999) summarizes the whole scenario as follows:

> "...........*rational phytotherapy need not proceed beyond the determination of phytoequivalenece of products prepared from standardized herbal extracts.............it is necessary to determine the identity of the principal actives so that chemical profiling and establishment of phytoequivalenece can be made more precise, but beyond this point phytotherapy [herbal medicine] separates from nonphytotherapy. The multiplicity of constituents in the former type product probably renders infeasible the isolation and marketing of purified compounds. It simply is not obligatory to go beyond the establishment of phytoequivalence for herbal products.*"

As summarized above, one of the distinguishing features of herbal products, as compared with conventional pharmaceuticals from plant sources, is that in the former pure active compounds need not be isolated, while in the latter, isolation, identification of the active compounds and detailed clinical studies are required before the products are marketed. In the case of Ethiopia, or even in advanced western countries for that matter, the latter approach is time-consuming and requires a huge financial and manpower investment. In particular, in Ethiopia this approach is economically prohibitive and above all unnecessary.

Conclusions

The verdant fecundity that once abounded in the spectacular landscape of Ethiopia is fast diminishing, owing to extensive deforestation and attendant natural calamities. In the process, many potentially valuable botanical remedies may be lost forever. Even the once-commonly available and still popular *Taverniera abyssinica* (the *Dingetegna* plant) is feared to be nearing extinction. At the beginning of the 20th century, 40 percent of the land in Ethiopia was covered with vegetation, and the current spread is estimated to be merely four percent. A natural conservation program aimed at preserving the existing affluence of medicinal plants should be envisaged and implemented.

Medicinal plant research in Ethiopia has a long way to go before the rich botanical flora is explored and exploited for useful remedies. Research in this respect needs to be geared towards finding cures for typical diseases that claim thousands of lives each year. It must be streamlined with the health (disease) priorities of the country. Malaria, leishmaniasis, leprosy, tuberculosis and recently AIDS are some of the most important diseases that medicinal plant research could be directed to. It has almost now been a cliche to say that medicinal plant research is a multi-disciplinary effort, requiring the collaboration of traditional healers, botanists, chemists, pharmacists, pharmacologists and clinicians for any meaningful results.

It appears that in Ethiopia, this type of approach is lacking, or at best minimal. While there has been a substantial amount of isolation and structure elucidation work on Ethiopian plants, the significance of these studies has not gone beyond scientific circles. Although such type of work may enrich our chemotaxonomic and phytochemical knowledge of Ethiopian plants, as well as giving the satisfaction of being published on the part of the researchers, it does not necessarily lead to isolation of biologically active (and therefore pharmacologically and medicinally useful) secondary metabolites, or the development of standardized botanicals, which have public health significance. To circumvent this shortcoming, plant selection for investigation, as well as bioassay procedures must be designed with the purpose of validating folkloric uses and/or isolating biologically active compounds, especially useful in the treatment of major diseases. A bioassay screening program of selected medicinal plants is perhaps a good starting strategy to ascertain the usefulness of follow-up work on plants. For this kind of work, simple and economical, but predictive bioassay methodologies need to be adopted, adapted or developed. Once the activity is pinned down to a certain plant extract, then extensive isolation work guided by bioassay whenever feasible, would lead to a compound (s) that may be active in certain given test systems. The active compound (s) obtained in this manner may be then used as a useful marker (s) to standardize formulated products, before and after establishing their clinical efficacy.

Meanwhile, as has been pioneered by the Ethiopian Health and Nutrition Research Institute, priorities of medicinal plant research need to be sorted out, in order to develop those common medicinal plants that the public uses most in fighting various medical afflictions.

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Glossary

Abortifacient (Abortive)-a drug or material that causes the expulsion of the fetus.

Acidosis-excessive acidity of body fluids, due to an accumulation of acids or an excessive loss of bicarbonate.

Acne-a chronic inflammatory disease of the skin glands characterized by papules and pustules.

Active principles (active components; active constituents)-chemicals in plants and other products that are responsible for biological or therapeutic activity.

Amebiasis-infection with ameba (minute one-celled protozoan).

Amenorrhea-absence or suppression of menstruation.

Analgesic-an agent that gives relief of pain.

Anatomy-the branch of science dealing with the structure of an organism.

Anthelminthic-a drug that kill or cause destruction and expulsion of worms.

Anthrax-an acute, infectious disease caused by *Bacillus anthracis*, usually attacking cattle, sheep, horses, and goats.

Antidysenteric-an agent that prevents or relieves dysentery.

Antifungal-a substance that destroys or inhibits the growth of fungi.

Anti-emetic-a drug that prevents or relieves nausea and vomiting.

Anti-inflammatory-an agent that counteracts inflammation.

Antimycotic-same as antifungal.

Antispasmodic-an agent that prevents or relieves spasm or involuntary and irregular contraction of the body muscles.

Antitussive-a drug that prevents or relieves coughing.

Aphasia-loss of verbal comprehension; inability to express oneself through speech.

Aphrodisiac-an agent which stimulates sexual desire.

Aromatherapy-treatment of disease through the use of various aromatic herbs, oils and similar preparations.

Ascariasis-intestinal parasitic infection caused by a group of roundworms and thread worms.

Astringent-an agent that has a constricting or binding effect, for example, one which checks hemorrhages, secretions, etc.

Biliousness-a symptom due to disordered condition of the liver, causing constipation, headache, loss of appetite and vomiting of bile.

Botanical nomenclature-system of classifying and naming plants.

Botanical remedies-medicines obtained from plants.

Biochemistry-the science of the chemical changes accompanying the vital functions of plants and animals.

Bronchitis-inflammation of the bronchial mucous membrane.

Buda-local term for evil eyes that cause ailments.

Callus-hardened skin (thickening of circumscribed area of horny layer of the skin).

Cathartic-an active purgative, producing bowel movements.

Carminative-a substance which prevents formation of, or promotes expulsion of flatus (wind generated in the stomach or bowels).

Central stimulant-an agent that stimulates or increases the activity of the brain.

Cerates-a medicinal formulation for topical use containing wax and of such consistency that it may be spread easily at room temperature upon muslin or similar material with a spatula and not yet so soft as to liquefy and run when applied to the skin.

Chemotherapeutic agent-a chemical agent which has a specific and toxic effect upon the disease-causing organism, or in the case of cancer against cancerous cells.

Cholagogue (choloretic, cholecytagogue)-an agent which increases the flow of bile into the intestine.

Chloasma-pigmentary skin discoloration usually those occurring in brown patches and spots.

Chlorosis-a form of iron-deficiency anemia

Constipation-infrequent defecation with passage of unduly hard and dry fecal material.

Contraceptive-a drug or method that prevents conception.

Contraindication-any symptom, circumstance or drug indicating the inappropriateness of a form of treatment otherwise advisable.

Contusion-an injury in which the skin is not broken.

Corn-horny induration and thickening of the skin, hard or soft, according to location.

Decoction-A liquid medicinal preparation made by boiling vegetable substances with water.

Decongestant-an agent that reduces nasal congestion.

Delirium-a state of mental confusion and excitement characterized by disorientation for time and place, usually with illusions and hallucinations.

Dermatitis-inflammation of the skin evidenced by itching, redness, and various skin lesions.

Diarrhea-frequent passage of abnormally watery bowel movements.

Digestant-an agent that will digest food or aid in digestion.

Diuretic-an agent which increases the secretion of urine.

Dropsy-morbid accumulation of water in the tissues and cavities.

Dysentery-intestinal disorders characterized by inflammation of the mucous membrane.

Dyspepsia-imperfect digestion caused by disease, or disorders.

Eczema-acute or chronic cutaneous inflammatory condition with erythema, papules, vesicles, pustules, scales, crusts, or scabs alone or in combination, which may be dry or wet.

Emenagogue-a substance which promotes or assists the menstrual flow.

Emetic-an agent that produces vomiting.

Emulsion-A mixture of two liquids not mutually soluble, usually one dispersed in the other.

Epigastric pain-pain originating in certain region of the stomach.

Esophagitis-inflammation of the esophagus.

Euphoria-an exaggerated feeling of well-being.

Expectorant-a substance that facilitates the removal of secretions of the broncho-pulmonary mucous membrane.

Extract-a solid or semi-solid obtained by extracting the soluble portion of a plant material with a fluid, followed by evaporation of the solution

Flatulence-excessive gas in the stomach and intestines.

Flora-plants found in a certain area.

Gangrene-a necrosis, or death, of tissue, usually due to deficient or absent blood supply.

Gingivitis-inflammation of the gums characterized by redness, swelling and tendency to bleed.

Gargle-a wash for the throat.

Gastric lavage-washing out of the stomach irritating substances accidentally or deliberately ingested, or for a medical procedure.

Gastritis-inflammation of the stomach.

Gastroenteritis-inflammation of the stomach and intestinal tract.

Gout-a metabolic disease marked by arthritis and inflammation of the joints.

Halitosis-offensive breath.

Heat labile-one that can be destroyed by heat.

Hemorrhage-abnormal internal or external discharge of blood.

Hemorrhoids-dilated blood vessels in the anal region liable to discharge blood.

Hemostatic-an agent which controls bleeding.

Hepatitis-inflammation of the liver of virus or toxic origin.

Homeopathy-a system of medicine where the disease is treated with very low doses of drugs, which themselves produce themselves the symptoms of disease in normal doses.

Hydrotherapy-scientific application of water in treatment of disease.

Hyperthermia-unusually high fever.

Impotence-weakness, especially inability of the male to achieve or maintain erection.

Indication-a sign or circumstance which indicated the proper treatment of a disease.

Infusion-a product obtained by steeping a substance in hot or cold water in order to obtained its active principles.

Inhalation-a product inhaled into the respiratory tract by breathing in.

Insomnia-chronic inability to sleep, or sleep interrupted by periods of wakefulness.

Kuruba-local name for disease claimed to be caused by starvation or infection by anthrax.

Laxative-an agent that acts to loosen the bowels by facilitating the passage of bowel contents at the time of defecation, and, therefore to prevent or treat constipation.

Leech-a blood-sucking parasite on man and other animals.

Leishmaniasis-infection affecting the skin, nasal cavities and the pharynx.

Lepropy-an infectious disease resulting from the invasion of nerves by *Mycobacterium leprae*.

Libido-the sexual drive, conscious or unconscious.

Materia Medica- medical matter; branch of science dealing with all drugs used in the treatment of diseases, their source, preparation, dosage and use.

Measles-a highly communicable disease characterized by fever, general malaise, sneezing, nasal congestion, brassy cough, conjunctivitis, spots on the buccal mucosa, and a maculopapular eruption over the entire body caused by rubeuola virus.

Megagna beshita-unexplainable affliction.

Menorrahgia-excessive bleeding at the time of menstrual period.

Micth-a local name for acute onset of generalized aches usually accompanied with fever.

Mollucsicide-an agent which kills bilharzia-transmitting snails.

Monograph-a treatise dealing with a single subject.

Mumps-a contagious disease characterized by inflammation of the parotid glands and other salivary glands.

Murine tumor -cancer induced in rats.

Mydriasis-pronounced or abnormal dilation of the pupil.

Myocardial infarction-development of an infarct (dead tissue) in the myocardium (middle layer of the walls of the heart), usually the result of myocardial ischemia following occlusion of a coronary artery.

Neuralgia-severe sharp pain along the course of a nerve.

Otitis-inflamed condition of the ear.

Oxytocic-an agent which stimulates uterine contraction during child birth.

Palpitations-rapid, violent, or throbbing pulsation, as abnormally rapid throbbing or fluttering of the heart.

Pessaries-contraceptive device

Pharmacological test-test conducted to study the effect of a medicinal agent.

Pharmacopeia-authorized treatise on drugs and their preparation, especially a book containing formulas and information which is standard for preparation and dispensation of drugs.

Photodermatitis-sensitivity of the epithelium of the skin to light.

Physiological-concerning body functions.

Phytochemical-chemicals or pertaining to chemicals that are found in plants.

Phytotherapy-treatment using medicinal plants.

Poison antidote-a substance that counteracts the effects of a poison.

Post-partum-occurring afer childbirth.

Potency-strength.

Poultices-a soft, moist mass of plant parts that are wrapped in muslin or gauze and applied warm or hot to the skin.

Prostatic disease-disease affecting the gland surrounding the neck of the bladder and the urethra in the male.

Pulmonary edema-accumulation of fluid in the lung tissue.

Purgative-an agent that causes watery evacuation of the intestinal contents.

Rabies-an acute viral infection mainly of the central nervous system transmitted to man by the bite of a rabid dog, cat, jackal, or bat.

Rectal prolapse-dropping the rectum.

Reflexology (Reflexotherapy)- treatment by manipulation, anesthetizing, or cauterizing an area of the body distant from the disorder or lesion.

Rheumatism-a general term for acute and chronic conditions characterized by inflammation, soreness and stiffness of muscles, and pain in joints and associated structures.

Ringworm-a common contagious disease produced by fungi that affects the skin, hair, or nails.

Scabies-a contagious parasitic disease of the skin caused by the mite *Sarcoptes scabies.*

Sciatica-neuralgic pain along the course of the sciatic nerve caused by inflammation injury to the nerve.

Secretolytic-inhibiting or drying secretions.

Sensitization-a condition of being made sensitive to a specific substance.

Stillbirth-birth of a dead fetus.

Spermicide-an agent that kills sperm cells.

Stomatitis-inflammation of the mouth.

Syphilis-an infectious, chronic, venereal disease characterized by lesions which may involve any organ or tissue.

Taenicide-an agent that kills tapeworms.

Taeniafuge-an agent that expels tapeworms.

Tinea captis-a fungal skin disease of the scalp.

Tranquilizer-a drug which acts to reduce mental tension and anxiety without interfering with normal mental activity.

Typhus-any of a group of acute infectious diseases characterized by great prostration, severe headache, generalized maculopapular rash, sustained high fever, and usually progressive neurologic involvement, ending in a crisis in 10 to 14 days.

Urinary retention-failure or inability to empty the bladder.

Uterine prolapse-a dropping of the uterus.

Vermifuge-an agent that expels intestinal worms.

Vertigo-a sensation of moving around in space or having objects move around a person and is the result of disturbance of equilibratory apparatus.

Vitiligo-skin condition characterized by milk-white patches, surrounded by areas of normal pigmentation

Warts-a circumscribed cutaneous elevation resulting from hypertrophy of the epidermis.

Some English-Amharic Names of Diseases[*]

Abdominal colic-kurtet; maryat; marat

Abdominal dropsy-aganint yasregezew; barya hodun yenefaw; zar wulaj yenefaw

Acne-bigur

Anthrax-aba senga

Ascariasis-wesfat

Bilousness-hamot

Eczema-chife

Eye bruise-ye ayn mebelez; bilz

Evil eye-buda; zar ayn

Evil spirit-irkus menfes

Frequent miscarriage/Neonatal death-shoteley

Gonorrhea-chebt

Gout-rih

Hemorrhoid-kintarot

Intelligence booster-letmihirt; ze aya gedef

Jaundice-wef; gubet

leech-alikt

Leishmania-chinkus; kunchir; shahign
Leprosy-kusil siga; tiklu dewe; bis gela; dewe siga; siga dewe
Malaria-weba; nidad
Measles-kifugn; ankelis
Menorrhagia-mergat; dem yadefebet; tikto himem; mergem dem yebezabet
Mental illness-ayne tila; ayne work
Migraine-ras filtet
Mumps-joro degif
Night blindness-dafnt
Rabies-kelb
Rectal prolapse-jerba dewe
Scabies-feres bet
Soar throat-gurae
Socery poisoning-siraye
Stabbing pain-wugat
Swelling-ibtet; ebatch
Syphilis-kitign; wurde
Tinea captis (favus)-buha ras
Tinea declavans-lash; lashign
Trachoma-Maaz; ayn maaz
Vitiligo-lemts

*Summarized from Abebe and Ayehu, 1993

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